Hugh Cecil Earl of Lonsdale.

261 A Manual of Pharmacy for the Student of Veterinary Medicine, containing the substances employed at the Royal Veterinary College, with an attempt at their classification, and the Pharmacopœia of that Institution. By **W. J. T. Morton,** Professor of Chemistry and Materia Medica in the College, Author of "A Veterinary Toxicological Chart," and "An Essay on Calculous Concretions in the Horse, Ox, Sheep, and Dog." London. 1854.

Fifth Edition. 8vo. M., $6\frac{3}{4}$ in. by $4\frac{1}{8}$ in.

A few diagrams in the text and a folding table at the beginning of medicinal substances used in veterinary practice, with many of their compounds according to their therapeutic properties. At p. 433—A Posological Table for the Horse, with the action of the medicinal substances. At p. 437—A Table of Symbols of Medicinal Compounds, with their equivalents.

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MANUAL OF PHARMACY

FOR

THE STUDENT

OF

VETERINARY MEDICINE;

CONTAINING

THE SUBSTANCES EMPLOYED AT THE ROYAL VETERINARY COLLEGE,

WITH AN ATTEMPT AT THEIR CLASSIFICATION,

AND

The Pharmacopœia of that Institution.

BY

W. J. T. MORTON,

PROFESSOR OF CHEMISTRY AND MATERIA MEDICA IN THE COLLEGE,
AUTHOR OF 'A VETERINARY TOXICOLOGICAL CHART,' AND 'AN ESSAY ON CALCULOUS CONCRETIONS IN THE HORSE, OX, SHEEP, AND DOG.'

"Affert maxime lumen memoriæ ordo."—*Cicero.*

FIFTH EDITION.

LONDON:
LONGMAN, BROWN, GREEN, AND LONGMANS,
PATERNOSTER ROW.
1854.

C. AND J. ADLARD, PRINTERS, BARTHOLOMEW CLOSE.

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4th L. Drs.

TO

THE MEMBERS

OF

THE VETERINARY PROFESSION,

This little Work

IS RESPECTFULLY DEDICATED,

BY THEIR FAITHFUL AND OBLIGED SERVANT,

THE AUTHOR.

PREFACE.

WHATEVER tends to lessen labour is assuredly advantageous. With this principle in view, the following pages have been arranged.

It has long been a subject of just complaint, that the student of Veterinary Medicine is compelled to acquire his knowledge of Materia Medica from foreign, and, as it regards him, not always correct, sources.

It is too much to anticipate that this feeble attempt will supply all that is required: it may not, however, be altogether in vain; and perhaps it may excite the energies of those who are not more willing than myself to

undertake the task, but far more able to accomplish it.

The slightest inspection will suffice to shew that my intention has been to aid the Veterinary Student. For him the compilation—for it pretends to very little more—has been made. To give that which is useful, rather than that which is novel, has been my desire; and my object will be fully obtained if I am successful, in any degree, in assisting him in the acquirement of correct principles.

In the pharmaceutical formulæ, I have studied simplicity. It will be seen that I have avoided all deceptives; and yet circumstances may render their addition necessary.

In the chemical compounds, I have followed the last edition of the Pharmacopœia of the College of Physicians, employing the names introduced by them, but not entirely discarding the old ones.

The diagrams explanatory of the decompositions which take place are on the plan proposed by Professor Reid, which I consider

more explicit than others. The dotted line .... implies that the substance is gaseous; the interrupted one - - - - - - - that it is a liquid, or in solution; and the continuous line ——— that it is a solid.

The views I have taken of the action of some agents may not accord with those which others take. From difference in opinion merely no disadvantage can arise; indeed by it truth is more likely to be arrived at, provided this be the object in view, and the searchers after it are actuated by a right spirit.

Wherever I have been made acquainted with peculiar views entertained, I have endeavoured to acknowledge the same, by giving publicity to the names of those persons from whom I received the information. Thus I am their debtor.

A word or two as it respects the classification. I know it is not without its faults; but these are more than counterbalanced by the benefit which the student has hitherto derived from it, and therefore I have ventured

to prefix it. Such agents as are used only for Cattle, are printed in italics.

And, now, a promise long since made to my pupils is performed. In making it, I may have done wrong; but in not attempting its fulfilment I should have done worse.

DEDICATION.

THE First Edition of this "Manual" was dedicated by me to the late Professor Coleman. He had long and honorably filled the chair of principal Professor to the Veterinary College, and from him I had received many personal acts of kindness, and much valuable information connected with my avocation; I, therefore, felt considerable gratification in being permitted publicly to express my acknowledgments to him. The grave, however, has long since closed over his mortal remains, and his spirit has passed from time into eternity.

Being still desirous of acting in consonance with my feelings, and as there are very many members of the Veterinary Profession to whom I am indebted for repeated manifestations both of respect and kindness, to them I dedicate this Edition, as I have done antecedent ones,—only regretting it is not more worthy of their patronage.

The demand thus made by the professional public for another Edition, cannot fail to be appreciated by me, as it offers an assurance that, although the attempt may have been feeble, it has not been in vain.

As science, at the present day, is marked by the rapid progress it is making, I have availed myself of all sources of information likely to contribute to the end I have had in view—the advancement of this division of Veterinary Medicine. Much that is new has been introduced, and much that is unnecessary withdrawn; by which, it is hoped, the general character of the work is increased in usefulness, and consequently in value.

And now, as stated by me in a previous dedication, it will not, I feel assured, be considered arrogant if I express my conviction that, although the established practitioner may not derive much information from these pages, yet the student, for whom they are principally written, will find their perusal profitable to him.

ROYAL VETERINARY COLLEGE;
London, October, 1853.

INTRODUCTION.

Matter, in its restricted sense, is defined by philosophers to be that which occupies space, or, in its more extended signification, that of which we can take cognoscence by our senses.

Chemists enumerate not less than fifty-five kinds of matter, called by them simple substances or chemical elements, and some writers a still larger number. These are designated *ponderable bodies,* in contradistinction to the *imponderables,* which are Heat, Light, and Electricity, with its modifications. Of these elementary bodies various divisions have been suggested: the simplest is into non-metallic and metallic substances.

By the union of two or more of these elements, in variable but always definite proportions, all the compound bodies with which we are acquainted are formed.

The resolving of a compound body into its constituents is denominated Analysis; and the re-uniting of these constituents, so as to again form the compound, Synthesis. By these processes we obtain a knowledge of the composition of bodies, which may

be *qualitative* as it respects their nature, and *quantitative* as it refers to the proportions in which their elements are united together.

Analysis is also *proximate* and *ultimate*. By the first of these we separate a compound body, made up of other compounds, into those compounds; by the latter, the compounds we have thus obtained are reduced to their elements.

As the following elements enter into the composition of the medicinal agents used by veterinary practitioners, they demand the attention of the student. Opposite to each its symbol, weight of atom, volume, and specific gravity, are placed.

Rather than attempt to offer that which must of necessity be an imperfect description of these substances, I would refer the student to some standard work on the science of chemistry. So rapid and unparalleled have been the advances made in this science of late years, that it becomes of the utmost importance that, while an author of acknowledged merit is selected, he is also one of the present day.

After the student has made himself well acquainted with the properties of these elementary bodies, he may pass on to the consideration of the compounds that are formed by their union with each other. The little discrepancies between chemical writers which may occasionally present themselves, and the differences in arrangement, are matters to him of

comparatively no moment, since the elements of medicinal agents are but few.

CHEMICAL ELEMENTS OF MEDICINAL AGENTS.

Symbol.	Substance.	Weight of Atom.	Bulk of Volume.	Specific Gravity.
O	Oxygen	8	▭	1·1093
Cl	Chlorine	36	□	2·470
I	Iodine	126	□	4·946
N	Nitrogen	14	□	0·971
H	Hydrogen	1	□	0·0649
C	Carbon	6	□	3·52
S	Sulphur	16	□	1·970 to 2·080
P	Phosphorus	32	□	1·9 to 2·
K	Potassium	40	—	0·865
Na	Sodium	24	—	0·972
Ca	Calcium	20	—	?
Ba	Barium	69	—	2·
Mg	Magnesium	12	—	?
Al	Aluminum	14	—	2·6
Fe	Iron	28	—	7·77 to 7·8
Zn	Zinc	32	—	6·8 to 7·2
As	Arsenicum	75	—	5·7 to 5·9
Sb	Antimony	129	—	6·712
Cu	Copper	32	—	8·788 to 8·958
Pb	Lead	104	—	11·445
Sn	Tin	59	—	7·28 to 7·6
Hg	Mercury	202*	—	13·568
Ag	Silver	108	—	10·4 to 10·6

* 100 Brande.

PROPERTIES OF MATTER.

MATTER has certain properties which are designated primary or essential, and secondary or non-essential. To the first belong *solidity, extensibility, divisibility, porosity, mobility, attraction, inertia.* To the second, *hardness, softness, colour, transparency, opacity,* &c.

All the primary properties above enumerated, strictly speaking, belong to a mass of matter, with the exception of the first, which alone can be said to refer to the ultimate particle. This, according to the atomic theory, or doctrine of definite proportions, is a solid, indivisible molecule, possessing a definite form and weight; the latter differing with the kinds of matter. The union of bodies takes place only between these ultimate particles; so that a mass of matter is a number of molecules adhering together by the exertion of a power designated attraction, of which we shall presently speak. The ultimate molecules suffer no change in the three states in which matter is said to exist; viz., the *solid, liquid,* and *gaseous;* these being dependent upon heat interposed between the solid particles.

The term IMPENETRABILITY has been chosen to express the same thing as *solidity.* It implies the property by which a body, or a mass of matter of a

definite form, occupies a certain space, to the exclusion of every other body.

EXTENSIBILITY signifies that the mass has length, breadth, and thickness.

DIVISIBILITY, that it is capable of being divided into many parts.

POROSITY, that pores or intervening spaces exist in it.

MOBILITY, that the particles have motion. This may be free or restrained. In solids, they are with difficulty moved; while in liquids, little resistance is offered to their motion, and in gases still less.

By ATTRACTION is understood the influence which causes bodies to approach each other; and this applies both to the ultimate particle and the mass. It is opposed by REPULSION, which, in all probability, is caused by heat. Attraction is of three degrees, or rather kinds: 1, *gravity;* 2, *the power of cohesion;* 3, *chemical affinity.*

1. GRAVITY exerts its force on bodies at great distances from each other. Through its influence the sun and planetary bodies retain their places in the system of the universe. By means of it every mass of matter removed from the surface of the earth, and left at liberty, must obey the attraction of the earth, and will thus be drawn towards its centre, or, in other words, it falls. The larger thus attracts the lesser body, and gives rise to what is popularly

called its *weight;* which is, the sum of the attractive force arising from the number of solid particles in the body attracted. To obtain a knowledge of this we employ an apparatus called a balance, or a pair of scales; which usually consists of a lever, supported by a fulcrum over its centre, the arms being equal. To the extremity of one of these is suspended the substance the weight of which we wish to ascertain, and to the other certain divisions of a known weight are cautiously added, until a perfect counterpoise is effected. The aggregate number of these unities gives us the required amount, this being so many grains, ounces, or pounds.

Medicines are compounded by Apothecaries' Weight, which is thus divided:—

	Pound.	Ounces.	Drachms.	Scruples.	Grains.
℔	1	12	96	288	5760
℥		1	8	24	480
ʒ			1	3	60
℈				1	20
gr.					1

Drugs are bought and sold by Avoirdupois Weight (to have overweight), which is divided as follows:

Pound.	Ounces.	Drachms.	Grains.
1	16	256	7000
	1	16	437·5
		1	27·975

I fear this difference is but little attended to, and that the pound and ounce, whether of Troy or Avoirdupois, are often used interchangeably. A reference to the tables will at once show the errors which are thus likely to take place. The pound of the latter contains 7000 grains, that of the former but 5760; while the ounce of the former has 480 grains, and that of the latter but 437·5.

For the sake of expedition and cleanliness in dispensing, liquids are measured, unless otherwise directed.

The Measure now used is designated the Imperial, which, for medicinal purposes, is thus divided:

	Gallon.	Pints.	Fluid Oz.	Fluid Drs.	Minims.
Cong. or C.	1	8	160	1280	76,800
O		1	20	160	9600
f℥			1	8	480
fʒ				1	60
♏					1

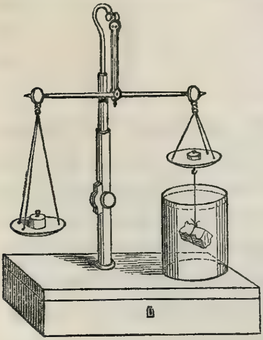
Placed opposite to the divisions are certain symbols, or characters, usually employed in writing: they also indicate whether the fluid is to be weighed or measured. The delineation of these the student would do well to practise a few times, until he has made himself familiarly acquainted with them.

Numbers are designated by the Roman numerals; i, ii, iii, iv, v, &c. When a half is required, an abbreviation of the Latin word *semi* or *semis*, a half,

is employed: thus ℔iss, a pound and a half; ℥iss, an ounce and a half; f ʒiss, a fluid drachm and a half, &c.

Different bodies of the same volume possess diffe-rent absolute weights: these are designated their *specific gravities.* The common standard or unity of comparison for solids and fluids is a cubic inch of pure distilled water at 62°; so that, should a cubic inch of any other substance weigh twice as much as a cubic inch of water does, its specific gravity is set down as 2; three times as much 3, and so on. For the gases atmospheric air is the unit of comparison. Specific gravity is therefore but another term for comparative weight, or density.

An acquaintance with the specific gravities of bodies is of importance in pharmacy, as a means of detecting adulterations, the weight of bodies being often a test of their purity.

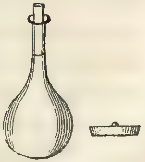


Various methods have been adopted, but we shall confine ourselves to the most simple.

The specific gravities of solid substances are usually ascertained by the aid of the *hydrostatic balance.* The substance being attached by a horse hair or piece of silk to the

scale, is first weighed in the air, and the weight noted down; then in pure distilled water (see figure, p. 18), when it will be found to have lost in weight, the amount of which must also be noted. Then, if you divide the weight of the substance when in the air by the loss it sustained when weighed in water, the quotient will give you its specific gravity: thus, suppose it first weighed 12 grains, and the loss was 6 grains, the former divided by the latter would give 2 as the specific gravity. This is founded on the hydrostatical axiom, *that every body immersed in a fluid loses just so much of its weight as is equivalent to the weight of an equal bulk of that fluid.* Not that there is absolute loss of weight, but the body is held up by the fluid under it; and, by comparing this force with the weight of the body itself, the comparative weight or specific gravity is ascertained.

Solids lighter than water are weighed in it by attaching to them a portion of some other substance, such as metal or glass, which has been already balanced in water for the purpose. Substances that are soluble in this menstruum are protected by a coating of melted wax, or varnish, or they are weighed in some other fluid.



The specific gravity of liquids is easily determined by the use of the "*thousand-grain bottle,*" which is sold by instrument makers, having

a counterpoising weight. When filled with distilled water to the mark in the neck, it contains exactly 1000 grains; therefore by filling it with any other liquid, and weighing it, the specific gravity is at once ascertained by calculating how much heavier or lighter it is than the same bulk of water. In the absence of a bottle of this kind, a phial having a tapered neck will suffice: a thousand grains of distilled water having been weighed into it, a mark is to be made with a diamond or file at the point where the water reached.

The same apparatus may also be used for finding the specific gravity of solids. "Reduce the substance to pieces sufficiently small to enter the bottle; then take the specific gravity of common water, and, having emptied the bottle, put 1000 grains of the solid into it, and fill up to the mark with the same water, and note the joint weight; subtract this from the sum of the separate weights of the specific gravity of the water and the 1000 grains of the solid, and with the remainder divide the specific gravity of the water, and the quotient will be the specific gravity of the solid."

The strength of ardent spirits is ascertained by means of *hydrometers*, the standard being an arbitrary spirit termed *proof* spirit, which consists of 49 parts pure alcohol and 51 of water: its specific gravity is 0·920 at 60° F. The relation which other

spirituous liquors bear to this, is expressed by saying they are so much *above* or *under* proof.

2. Attraction of Cohesion.—This differs from *gravity* in operating only at very small, insensible, or immeasurable distances, and between the ultimate particles of the *like* kinds of matter. It being that force which unites the particles into a mass, hence it has been designated Attraction of Aggregation; and the terms Molecular, Corpuscular, Contiguous, and Homogeneous Attraction, have likewise been employed to signify the same power.

It is often opposed to chemical action, and certain processes are had recourse to in order to overcome it. These are either *mechanical* or *chemical*. But whatever mechanical power we may exert, we cannot completely destroy the attraction of cohesion; therefore by mere physical force a mass of matter has never been reduced to its ultimate atoms so as to render them cognizable by the senses. We may resolve the body into inconceivably small portions, yet each portion is still a coherent mass.

It will be evident that attraction varies in the different states of matter, being greatest in solids, and less powerful in liquids, and among these it also varies; while in gases it is supposed to have no existence, their particles being mutually repellent of each other.

PHARMACEUTICAL OPERATIONS.

1. Mechanical Processes.

These include *Pulverization, Trituration, Grinding, Sifting, Washing, Expression,* and *Filtration.*

Pulverization is the reduction of a mass of matter to a state of powder. The operation is effected in mortars made of iron or Wedgewood's ware, by the aid of pestles.

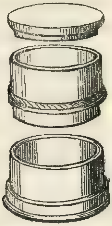
The iron mortar, which is the one employed when much force is required to cause a disgregation of the particles, is best placed in an outhouse. It should be furnished with a perforated wooden cover, the hole being a little larger than suffices to admit the pestle. The escape of the finer portions is thus, in a great measure, prevented; but the operator will be effectually defended from annoyance when powdering disagreeable and noxious drugs, such as aloes, cantharides, &c., by a damp cloth being placed over his mouth and nostrils. Substances less resisting may be pulverized in mortars of Wedgewood's ware, which should be kept in the pharmacy, of two or three sizes.

They have superseded those of marble, on account of their cleanly appearance, and from their not being acted upon by any of the mineral acids. A rotatory motion is given to the pestle under such circumstances, and the act is designated TRITURATION.

Connected with the use of mortars are SPATULAS, These should be of steel and bone, or lance wood; the latter being used when acidulous compounds are dispensed. Their employment calls for some *tact*, which can be acquired only by experience. Horn scoops are also necessary for the purpose of removing the different substances out of the larger mortars.

GRINDING is effected by hand and other mills; and when a coarse powder only is required, as of seeds, it affords a ready means of obtaining our desired purpose.

Disintegration being accomplished by either of the above processes, the particles will still be found to vary very considerably in size; in order, therefore, to obtain a degree of uniformity in this respect, the pulverized matter is passed through a sieve, and the process is called SIFTING.



Sieves are either simple or compound. The compound sieve should always be employed when any considerable quantity is operated on. Its central part consists of a broad

wooden hoop, across which is stretched fine wire, gauze, or hair cloth; to this is fitted a top and bottom made of hoops covered with leather. The simple sieve is the central portion only. It is obvious that the former is best suited for the purposes of the veterinary surgeon; and after the finer particles have been separated from the coarser, the latter may be again subjected to the action of the pestle without loss or inconvenience.

When an impalpable powder is wanted, the process of WASHING is had recourse to; but it is evident that this can only be available with those substances which are insoluble in water. Being diffused through a quantity of this fluid, the coarser particles are soon precipitated, while the finer remain for a time in a state of mechanical suspension. The turbid supernatant fluid being decanted, it is allowed to stand at rest until the fine powder has deposited itself, which is subsequently dried.

The minute division of a therapeutic agent demands more attention than is usually paid to it. In this state it more readily undergoes solution in the stomach and alimentary canal, and being spread over a greater extent of surface, produces the desired effect quicker, whether its influence be local or remote.

The juices of many vegetables are obtained by EXPRESSION, and these, by inspissation, form *extracts*. The greater number of the *fixed* oils are

similarly procured. The press usually consists of two plates of iron, capable of being brought into apposition by means of a screw, between which the matter to be subjected to pressure is placed, it being previously enclosed in bags of horse-hair, or some other material. The dregs of tinctures are often thus treated, and the spirituous solution, as it passes out, acquires turbescence from the escape of the insoluble particles through the pores of the bag. This and other solutions are rendered clear by FILTRATION, which may be viewed as a finer kind of sifting. In order to separate the solid from the fluid parts, or, in other words, to render the solution transparent, the mixture is passed through cone-shaped bags made of fine flannel, linen, or bibulous or unsized paper; the last being most commonly employed. A square piece of such paper is doubled so as to form a triangle, and by a second doubling made into a smaller triangle. By separating one layer from the other three, a cone is formed, which is placed in a Wedgewood's ware funnel, having ribbed sides; and the fluid to be filtered is then gradually poured on the side where three layers of the paper exist, until it nearly reaches the top; or a glass rod is used as a director. Sometimes the first portions that pass out are turbid, arising from the pores of the paper being as yet too

open: these are to be returned into the filter again and again, until the liquid percolates perfectly clear and limpid. The concentrated acids and alkaline solutions are commonly filtered through sand; a coarse kind of sand being first placed in the neck of the funnel, and a finer sort above it. Sometimes powdered glass is employed for this purpose.

2. Chemical Processes.

These embrace, 1st, *Solution, Lixiviation, Digestion, Maceration, Precipitation, Infusion*, and *Decoction,* some of which are aided by heat. 2d, *Liquefaction, Evaporation, Drying, Distillation*, and *Sublimation*—changes induced only by heat.

Solution is the chemical union of a solid with a fluid, the compound possessing transparency and permanency. It is evident that a solid undergoing solution is subjected to the influence of two forces, namely, the attraction of cohesion existing between its own particles, and the affinity which the fluid has for them. It is said to be *saturated* when these two forces counterbalance each other; or when the fluid has taken up as much of the solid as, at ordinary temperatures, it can enter into combination with.

A *solution* differs from a *mixture* in this respect—in the first we have chemical union and transparency; in the second there is merely a mechanical suspension

of a solid in some menstruum, and consequently turbidity to a greater or less degree. The general solvent for saline substances is water, and, when these are mixed with insoluble ingredients, a rude species of filtration is resorted to. Large vats are employed, having holes at the bottom, on which a layer of straw is first placed, and on that a cloth containing the substance to be acted on: water, either hot or cold, is now poured over the substance, which, percolating through, carries with it the soluble parts, and this is called a *ley*, the process being denominated LIXIVIATION.

The menstrua by which the soluble parts of vegetables are extracted, consist principally of water and alcohol, or a combination of these, which, according to Dr. Paris, acts the part of a chemical compound, the union effecting what neither fluid would, if separately applied. The resulting solution is designated a TINCTURE. When this is carried on with the assistance of heat, it is expressed by the term DIGESTION; when without it, by MACERATION.

When large quantities of Tinctures are made, it is a good plan to suspend the agent required to undergo solution in a calico or linen bag, causing it to dip a little below the surface of the fluid. As the soluble matter is abstracted, the solution acquires increased specific gravity, and thus a current is kept up.

It occasionally happens that a solid held in solution is thrown down by the addition of a third substance which has a greater affinity for the menstruum than it has. This operation is called PRECIPITATION, the agent so acting is termed a *precipitant*, and that which is separated a *precipitate*. The obtaining of the precipitate may or may not be the chief object of the process; when it is, tall glass jars are the best vessels in which to collect it. The supernatant fluid is to be removed by decantation and filtration, and the precipitate subsequently dried. By this means we obtain medicinal agents in a high state of comminution.

A knowledge of the agents which cause precipitation is essentially necessary in extemporaneous prescriptions; otherwise, by the injudicious combination of therapeutic substances, compounds may be formed that are inert, or perhaps noxious rather than salutary. Hence arises the value of an acquaintance with the science of chemistry as applied to medicine. These substances are of equal importance viewed in reference to cases of poisoning, and as tests or re-agents.

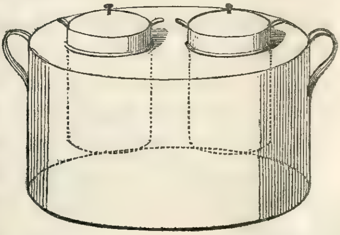
An INFUSION is made by pouring boiling-hot water on sliced or rasped vegetable matter, and allowing it to stand until cold, when the soluble and aromatic parts will be taken up. The vessels used for this

purpose should radiate slowly, and, at the same time, the material of which they are composed should be a bad conductor of heat. Sometimes cold water is employed, and then a longer time is necessary for the purpose of abstracting the active principles.

A DECOCTION is obtained when the vegetable matter is boiled in any menstruum, by which its solvent power is increased. It is evident that this process will not be available when we wish to possess the volatile constituents of the agent; nor does it answer for some of the fixed, for instance, Extractive matter, which by long boiling is rendered inert.

When the liquor obtained by infusion or decoction is subjected to evaporation, the watery parts are dissipated, and a soft solid mass remains behind, which is called an EXTRACT.

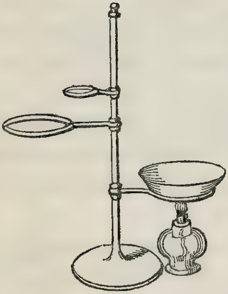
LIQUEFACTION is the conversion of a solid into a fluid by the agency of heat. This, in the pharmacy of the veterinary surgeon, is best effected by means of a *water bath*, and one may be easily formed by suspending any covered vessel within another in which

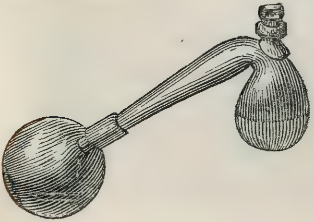


water is placed. The one in use at the College is

made of tin, and consists of two vessels of an oval form, placed in a larger oval. It is found to answer its purpose. One division is kept for the formation of aloetic compounds; the other for ointments, &c.

Evaporation is an extension of the same process as liquefaction, when, more heat being applied to the liquid, it is converted into vapour. This is commonly effected in shallow vessels, called evaporating dishes; and is resorted to when we wish to obtain saline substances from their solutions in a crystalline form, or for the dissipation of moisture from a fixed principle, so as to procure it in a state of *dryness*. The heat is usually communicated by means of a lamp, or a sand-bath.

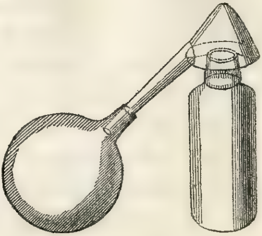




Distillation differs from evaporation in this respect only; the vapour, after being elevated by heat, is condensed in close vessels, and

preserved. When small quantities are operated on, the *retort* and *receiver* are employed. Larger quantities require the *common still*. By this operation the more volatile are separated from the grosser parts of the liquid.

SUBLIMATION is to solids what distillation is to liquids; and the apparatus in which this change takes place is denominated a *Cucurbit,* to which is attached a *capital,* and oftentimes a *receiver*. So formed, it constituted the distillatory apparatus of the alchemists.



Attraction is called CAPILLARY when it is exerted between liquids and solids, the latter having empty spaces within them. The term is derived from *capillus,* a hair; since tubes having fine hair-like cavities show this most markedly.

CRYSTALLIZATION is also a modification of attraction, in which this force seems to operate, not all around each particle, but between certain parts of one and corresponding parts of the adjoining particles; whence result those regular and definite forms denominated *crystals*.

Probably almost all inorganic bodies assume a

crystalline form; but it is particularly seen in the metals, sulphur, camphor, and the various salts.

To bring it about, the particles must be allowed freedom of motion; therefore the first step to be taken is to give to the solid either a liquid or gaseous form: the first is usually effected by solution in water, the second by the agency of heat. Space and time are then required, so that the particles may arrange themselves according to the polarity of their atoms.

Several circumstances influence the formation and regularity of crystals, as light, heat, motion, and the electrical state of the air.

In pharmacy, when heat alone is applied to the solid, the process is designated sublimation, as before observed; and thus it is we obtain sulphur, camphor, the chloride and bichloride of mercury, &c., in the form of crystals.

When a saline and crystallizable substance is in solution, the fluid is directed to be evaporated until a *pellicle* appears on its surface. This pellicle is produced by the particles of the solid congregating together in a confused manner, and is a proof that their attraction for each other is greater than that of the fluid for them. It is called the *point of crystallization;* and, as soon as it is seen, the process of evaporation should be stayed, and the vessel allowed to remain at rest, so that crystallization

may take place, otherwise an irregular mass will be formed.

It sometimes happens that this *pellicle* or *film* does not readily show itself. The solution is then to be tested by withdrawing a drop or two on a piece of glass, or some other substance. If, on exposing this to the cool air, crystals begin to form, the evaporation has been carried sufficiently far.

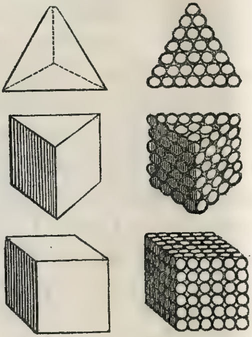
When crystals are tardy in forming, a portion of the same kind of salt thrown into the solution will often hasten the desired effect. It acts as a nucleus, around which the particles arrange themselves. Sometimes a foreign body is introduced for this purpose. The supernatant fluid is called the *mother water*, and more crystals are obtainable from it by boiling.

Many salts contain water in a state of chemical combination with them: they are then designated *hydrous*. It gives to them hardness, brilliancy, and transparency, and often determines their form. It is called *water of crystallization;* and occasionally it exists in such large quanties, that, when the salts are heated, they dissolve, or undergo *watery fusion*. Such as do not contain water are said to be *anhydrous*.

A salt *deliquesces*, when it absorbs so much moisture from the air as to become semi-fluid; and *effloresces*, when it yields up to the air so much of

its water of crystallization as to lose its form and assume the state of powder.

DECREPITATION is a crackling noise arising from the splitting of the crystals, and is caused by heat.



The figures or forms of crystals appear to be multifarious, but they are reducible to a few primitive nuclei:—the *Tetraëdron* or simplest pyramid, which is bounded by four surfaces; the *triangle* or simplest prism, having five surfaces; and the *cube* or simplest solid, having six surfaces, parallel two and two.

The more complex or secondary forms are supposed to result from the superposition of other laminæ upon these.

Comparatively simple as this theory is, Dr. Wollaston ingeniously suggested that all the primitive forms might be reduced to one, and that one, the supposed form of the ultimate particle of matter, viz., the spheroid. This a reference to the diagrams will explain. The secondary figures he made to depend on increment of the particles, this being influenced by different contingent circumstances.

It was thought at one time that every substance possessed a definite crystalline form, and that a means was thus afforded by which a knowledge of its nature and purity could be ascertained. This, however, cannot be relied on, since there are compounds whose forms are alike, but whose chemical constitution is altogether different.

Those which crystallise in the same forms are said to be *Isomorphous;* those which are nearly alike, *Plesiomorphous;* and when a substance affords two kinds of crystals, it is designated *Dimorphous.*

3. Chemical Affinity.—This power, like attraction of cohesion, exerts its influence only at inconceivably small or insensible distances, but differs from it, in taking place between the particles of dissimilar kinds of matter; hence, in contradistinction, it has been sometimes called *Heterogeneous Attraction.* It is divided into *single* and *compound,* or simple and complex: but, for further information on this head, as well as for the laws which govern the combination of bodies, and the properties of the simple or elementary substances already adverted to, with the compounds that are formed by their union with one another, I must again refer the student to some of the many valuable treatises on the science of chemistry.

The remaining primary property of matter unno-

ticed is Inertia, by which is implied its inactivity *per se*, or passiveness.

The *secondary* properties of matter, as hardness, softness, transparency, &c., call for no comment here.

MEDICINAL SUBSTANCES.

THEIR ACTION AND DOSES.

Medicinal Agents are either natural or artificial. The former are derived both from the organic and inorganic kingdoms, being furnished ready prepared by nature: the latter undergo some modification, and hence they are called pharmaceutical preparations. Many are formed wholly by art.

The manner in which these substances operate involves an interesting therapeutical inquiry. *Why* they should produce their peculiar action is, perhaps, altogether inexplicable. Their influence is referable to either mechanical, chemical, or vital laws, and sometimes to the whole of these combined. Their effects may be attributed,—

1st. To the impression communicated by them to the part to which they are applied, and which is, or is not, transmitted to other parts, through the medium of the nerves.

2dly. The agent may be taken into the circulation, and pass unchanged to certain organs which it excites;

or, becoming decomposed, may produce action by one or more of its constituents.

Thus the changes they induce are either local or remote. They are also relative agents; the amount of their operation depending, in a great degree, upon the peculiar condition of the body. Their full action has reference to the existence of disease in some part or parts of the frame, either functional or organic, which they overcome, and thus they favour the return of health.

They do not produce the same effects in all states of the system; but these effects, if not determined, are much modified by any morbid change which may have taken place. From this is at once seen the value of a knowledge of the action of medicines during the prevalence of disease; when the "harp of a thousand strings" is for a time untuned.

It has been well remarked, that nothing is less accurately fixed in medicine than one of its most important objects, namely, the doses of remedies. Here it is extremely difficult, if not impossible, to lay down any definite rules. The proper dose of a therapeutic substance is undoubtedly that quantity which produces the effect required, whatever may be its numerical denomination. I shall therefore merely state the minimum and maximum doses of each medicinal agent.

It is well known that young animals are more easily acted on than old ones; and it has been stated,

that a colt of a year old will require only one third of that which is necessary to cause the desired action in a full-grown horse; one of two years old one half; and a three-years old two thirds as much. Perhaps the same laws will apply to other animals; but experiments are wanting to confirm them.

No one rightly instructed will neglect the consideration of many circumstances that materially affect the operation of a therapeutic agent, as conformation, condition, age, sex, nature of the disease, temperament, season of the year, and the idiosyncracy of the patient; nor must a judicious combination of remedies be forgotten.

Under this head I would advise the study of Paris's 'Pharmacologia,' and Thomson's 'Materia Medica.' The principles there laid down should not be lightly passed over, although all advanced by these writers may not be found to apply to veterinary medicine.

MODES OF ADMINISTRATION.

The forms in which medicines are generally exhibited are the ball and the draught. The first is the safest, and, consequently, is most commonly preferred. The shape of a ball should be that of an elongated spheroid; and, for the sake of cleanliness, it should be enveloped in tissue paper before administered. The size in which it is commonly given is too large. It should never exceed an ounce and a half in weight:

an ounce would be preferable, and, indeed, it may be said, without fear of contradiction, that a ball can neither be too small, nor of too soft a consistence, provided it can be given. On this account it is not an advisable plan to keep many balls ready formed. In large establishments, however, for the sake of expedition, this rule is often departed from. It is far better that masses should be retained in jars whose inner surface is covered with a film of oil, and portions of them abstracted when required.

The draught, likewise, has properties that we avail ourselves of, and in many instances this form is imperatively called for. Action is more quickly induced by it than by the ball, not only from its not being so long retained in the stomach, but also from its being diffused over a greater extent of surface: its effects, however, more quickly pass off.

For cattle and sheep this is the almost invariable mode in which medicines are exhibited. The great advantage resulting from this is, that fluids, after passing into the rumen, flow quickly onwards into the second and third stomachs, without being regurgitated, like solid ingesta, before they enter the fourth, or true digestive stomach.

For the dog, both pill and draught are resorted to.

Some medicaments are advantageously given through the medium of enemas. This is particularly the case when a speedy evacuation of the bowels

is required. Possibly they merit a more general employment than hitherto they have been thought deserving of, since absorption is very rapid from the large intestines, and the agent undergoes but little change before it is taken into the circulation. Others may be sprinkled over the animal's provender.

A few vaporous and gaseous bodies are inhaled, and sometimes an extension of the endermic method is very properly adopted; a seton, or a rowel, being covered with the agent and placed under the skin. The energetic substances that can be thus applied are chiefly the vegetable alkaloids, hydrocyanic acid, &c. In extreme cases, direct injection into the veins is had recourse to, but only in extreme cases; and here, more than in any other division, data are wanted to guide us. It is a rich and an almost untrodden field, and would amply repay the labour of the cultivator.

A little advice, perhaps, should be given respecting the DISPENSARY OF PHARMACY; but were I to enter fully into this, I should say more than would be agreeable to many, for too little care is generally manifested in this department. Negligence necessarily leads to the accumulation of filth, and this to waste. Over the door, or in some conspicuous place, these mottoes may be written—

ORDER IS GAIN.

"A PLACE FOR EVERY THING, AND EVERY THING IN ITS PLACE."

The Pharmacy should also be furnished with fit apparatus for compounding of medicines, as balances, graduated and other measures, mortars, &c., since all the pharmaceutical compounds should be made by the practitioner or his assistant, and almost every drug employed by him powdered under his superintendence. Thus alone will he ensure the full action of his therapeutic agents.

If possible, uniformity of temperature should be preserved. And although no display is called for, yet neatness will be ensured, and the place rendered both agreeable and profitable to the student, by attention to those little things which so much enhance his comfort. A small library, containing a few select books, and a table, with chemical apparatus, (not, however, of a costly kind,) may be introduced; while the fire-place will suffice both for making his pharmaceutical compounds, and performing experiments when the duties of the day are over. Thus will he be almost unconsciously laying the foundation for future acquirements. I urge this, because I know how sadly the inculcation of first principles is neglected by too many, and of how much importance it is that they should be implanted in early life; for by means of them alone can the superstructure be raised either pleasurably or permanently.

A

MANUAL OF PHARMACY,

&c.

ACACIÆ GUMMI, *Acacia Gum.* Vulgo: Gum Arabic.

GUM is a proximate vegetable principle, probably the result of the first and simplest change which the sap undergoes.

Many varieties exist, but the kind most in use is yielded by the *Acacia Vera*, which is a native of the sandy parts of Arabia Petræa and Egypt. It exudes in a liquid state from fissures in the bark of the trunk and branches, but soon hardens on exposure to the sun and air. It has been conjectured to be the result of disease, since weakly trees, in wet seasons, yield the greatest quantity.

Many kinds are met with in the shops, and different qualities are found mixed together in the same package, termed "gum in sorts." The best comes from Morocco in chests and casks, and has a specific gravity varying from 1·30 to 1·50.

Composition.—Liebig makes gum to consist of,

12 atoms	carbon	. .	$6 \times 12 = 72$
11 ,,	oxygen	. .	$8 \times 11 = 88$
11 ,,	hydrogen	.	$1 \times 11 = 11$
	Equivalent	. .	171

Other writers double these proportions. It is thus seen to be an hydrate of carbon.

Qualities and Uses.—Good gum occurs in pieces of an irregular shape and size, which are colourless, or nearly so, semi-transparent, insipid, and inodorous. It is soluble in water in every proportion, but insoluble in oil and alcohol; the latter precipitating gum from its watery solution. Its action is that of a demulcent, sheathing the surfaces over which it passes, and defending them from the action of acrid substances. For this purpose it is employed in the form of mucilage, made by dissolving one part of gum in two or three parts of water; which is frequently had recourse to as a vehicle for the suspension of insoluble matters, such as chalk, hellebore, &c.; and occasionally for rendering oils miscible with water, thus forming emulsions.

Much has been said of the use of mucilaginous solutions in urinary affections; the relief which they afford, however, may be referred to the fluid that is given, the gum probably undergoing some change in the alimentary canal.

Many practitioners employ mucilage to give consistence to masses, but such are apt to become hard; a better material is either honey, treacle, lard, or palm oil, or soft soap when admissible.

Acidum Aceticum, *Acetic Acid.*

Old names: Strong Acetic Acid, Pyroligneous Acid.

After the vinous fermentation has been excited in a saccharine solution, and this is exposed to the influence of the atmosphere and a higher temperature, another kind of action is set up, which terminates in the formation of a sour compound denominated vinegar, a fluid too well known to need much description. It contains water, colouring matter, mucilage, and a little alcohol, besides acetic acid, which is the cause of its acerbity. This never amounts to more than five per cent., and appears to be formed by the decomposition of the alcohol and an absorption of oxygen from the air. The following diagram will explain the process.

Change during the Acetous Fermentation.

Materials.		*Products.*
1 Equiv. Alcohol = 46	Carbon . 4 eq. 6×4 = 24	1 eq. Acetic Acid = 51
	Oxygen . 2 „ 8×2 = 16	
	Hydrogen 6 . . { 3	
	3	
4 Equiv. Oxygen = 32	Oxygen . . . . = 8	
	Oxygen 3 equi. 8×3 = 24	3 eq. Water 9×3 = 27

By the distillation of ordinary vinegar we obtain diluted acetic acid in a state of comparative purity; but by far the greater quantity is now procured by the destructive distillation of the harder woods. For this purpose billets of these woods are placed in iron cylinders and subjected to heat, when much watery vapour and some inflammable gases are disengaged, and the products collected in the receiver consist of dilute acetic acid, tar, empyreumatic oil, and pyroxylic spirit. Charcoal remains in the retort. The impure acid being allowed to stand undisturbed for some weeks, deposits the tar, but it yet retains much of its colouring matter and peculiar odour; these are partly removed by re-distillation. To this distilled acid, lime is now added to saturation, and the acetate of lime formed is decomposed by means of sulphate of soda: a sulphate of lime is thus thrown down, and an acetate of soda remains in solution. This is evaporated to dryness, and fused at a high temperature, so as to separate the impurities, taking care not to decompose the salt. This is afterwards effected by means of sulphuric acid aided by heat, in a retort, when acetic acid passes over, and a sulphate of soda remains behind.

The following diagrams will more satisfactorily explain the processes:

79 Acetate of Lime	Acetic Acid	= 51	83 Acet. of Soda
	Lime	= 28	
72 (dry) Sulphate of Soda	Soda	= 32	
	Sulphuric Acid	= 40	68 Sulph. of Lime
(162 crystallized)	Water 9×10	= 90	

83 Acetate of Soda	Acetic Acid	= 51	60 Liq. Acet. Acid
	Soda	= 32	
49 Liquid Sulphuric Acid	Water	= 9	
	Sulphuric Acid	= 40	72 dry Sulphate of Soda.

Sometimes the acetate of lime is decomposed by the direct application of sulphuric acid, when the change effected is obvious, being as follows :—

79 Acetate of Lime	Acetic Acid	= 51	60 Liq. Acet. Acid
	Lime	= 28	
49 Liquid Sulphuric Acid	Water	= 9	
	SulphuricAcid	= 40	68 Sulph. of Lime.

Composition.—3	atoms	oxygen . .	$8 \times 3 = 24$
3	,,	hydrogen .	$1 \times 3 = 3$
4	,,	carbon . .	$6 \times 4 = 24$
		Equivalent . .	51

The College of Physicians directs it to be prepared from the acetate of soda, as already given.

Qualities and Uses.—Acetic acid is a pellucid colourless fluid, agreeably sour, and possessing the penetrating odour of vinegar. Its strength is ascer-

tained by its saturating power: for instance, dry acetic acid saturates almost exactly its own weight of pure carbonate of lime; or 50 parts will saturate 117 of crystallized carbonate of soda. Constituted as above, it can exist only in combination with a base. When this is water, it is designated *glacial acetic acid,* from its becoming solid and crystalline at a low temperature; and it consists of,

1 atom	acetic acid	=	51
1 ,,	water .	=	9
	Equivalent . .		60

Of the specific gravity of 1·048 as usually met with, it contains 30·7 per cent. of real acid, and 100 grains will saturate 87 of crystallized carbonate of soda.

This is about six times the strength of ordinary vinegar, and, if it be in this proportion diluted with distilled water, it will supersede that compound for all medicinal purposes. It is a rubefacient and antiseptic, correcting the fetor of phagedenic ulcers; and it assists in the exfoliation of carious bone. As an external applicant, however, it is seldom employed except as the solvent of more active substances. Combined with hydrochlorate of ammonia, it is used as a discutient for indolent tumours; and, diluted with water, it has been occasionally resorted to with success for giving tone to the relaxed fibre in cases of sprain, &c. As strong acetic acid

readily dissolves camphor and the essential oils, an efficacious rubefacient may be made by their union.

Tests.—When pure, it is entirely evaporated by heat. If sulphuric acid is present, it is shown by the addition of acetate of lead, which is converted into an insoluble *sulphate of lead;* hydrochloric acid, by nitrate of silver, which throws down a *chloride of silver;* nitric acid, by silver undergoing solution in it, which may be precipitated by hydrochloric acid in the form of a *chloride;* lead, by the iodide of potassium, forming an *iodide of lead;* and copper, by ammonia, which forms the *ammoniuret of copper.*

Incompatibles.—Acetic acid is rarely given as a medicine. Occasionally it has been administered for the purpose of checking internal hæmorrhages; but the diluted mineral acids are to be preferred, which produce this effect by coagulating the albuminous part of the blood, as they undergo no change *in transitu.*

It is mostly employed as a topical remedy. Pharmaceutically it is used as a solvent for the active principle of the blistering fly, and in the formation of the acetates of ammonia and of lead.

It is incompatible with the alkalies, the earths, their carbonates, and most substances that are acted upon by other acids.

The impure pyroligneous acid, as it passes over contaminated with tar, has been found serviceable in cases of mange, herpes, &c.; but the tarry matter

that remains after the distillation of the impure acid is more commonly used, under the name of *Oil* or *Spirit of Tar;* it being for this purpose mixed with an equal quantity of any bland oil. A better compound is formed as follows, constituting the ordinary mange liniment of the College:

LINIMENTUM PICIS LIQUIDÆ COMPOSITUM,
Compound Liniment of Tar.

Take of Pyroligneous Oil of Tar,
Oil of Turpentine,
Whale, Seal, or Rape Oil, of each equal parts.

Mix together, so as to form a liniment. This is to be applied by means of a brush every second day for two or three times, and then washed off with soft soap and water. In severe cases of mange the addition of a sufficient quantity of sulphur so as to form a soft paste, may be beneficially made.

OIL OF TAR is also procured by the distillation of common tar, pitch being the residuum. When recently distilled, it is a transparent fluid of a pale colour, which becomes of a dark brown by age. It has the smell of tar, and burns freely, emitting much smoke. It readily mixes with alcohol, and the fixed and volatile oils, leaves a greasy stain upon paper, and evaporates very slowly on exposure to air. Its specific gravity is 1·46.

It has been extensively employed as an excitant to wounds, which it powerfully stimulates; and, consequently, when the healing process is tardy in them, it will be found a useful application. Its offensive smell, however, may preclude its general use. It is a valuable adjuvant to most compounds for mange in all our domestic animals; and is of admirable utility in preventing the attack of the fly, or for healing the wounds inflicted by the fly on sheep. Perhaps its activity, both when applied to the skin and as a traumatic, is referable to the presence of *creasote.*

Wood-spirit or pyroxylic alcohol is another product of the destructive distillation of wood, amounting on an average to not more than one *per cent.* It is separated from the crude wood vinegar by distillation, then re-distilled, and rectified over quicklime, when a pure spirit passes over, which is an active solvent of the gum resins. It will therefore be found to be a valuable substitute for rectified spirit of wine in the formation of the tincture of aloes and myrrh, and also a menstruum for the active principle of the blistering fly. In the shops it is sometimes known by the name of rectified naphtha; chemically it is viewed as an *hydrate of the oxide of methyle*, being the alcohol of the *methylic* series. It is a limpid, volatile liquid, having a peculiar odour, and a hot disagreeable taste. It is inflammable, burning with a pale-coloured flame,

depositing no soot. Its specific gravity is about ·800. When pure, is not altered by exposure to air or light, and mixes in all proportions with water, alcohol, and ether without becoming turbid. Acted on by sulphuric acid, it forms an ether—*wood-spirit ether, or oxide of methyle*—as alcohol does.

Composition.—2 atoms	carbon . .	$6 \times 2 =$	12
4 ,,	hydrogen	$1 \times 4 =$	4
2 ,,	oxygen . .	$8 \times 2 =$	16
	Equivalent		32

Acidum Arseniosum, *Arsenious Acid.*
Vulgo: Arsenic.

The metal *arsenicum* is capable of combining with different proportionals of oxygen, amongst which the one under notice is the most common. It has received various names, such as the oxide of arsenic, white arsenic,—and, for brevity, arsenic. It is principally brought from Saxony and Bohemia, where it is obtained in large quantities by roasting the ores of cobalt, and likewise arsenical pyrites. For this purpose a furnace resembling a baker's oven is used, having a long flue or horizontal chimney, into which the fumes pass and are condensed in the form of a greyish or blackish powder. This is refined by a second sublimation in close vessels, adding a little potassa to detain the impurities.

Composition.—1 atom arsenicum . . . . . = 75
3 atoms oxygen . 8 × 3 = 24

Equivalent 99

Qualities and Uses.—Arsenious acid occurs in two forms, either in that of a solid semi-vitreous mass, or in opalescent pieces. It is commonly sold in the shops in the state of powder, when it is frequently mixed with either the carbonate or the sulphate of lime or baryta, a fraud which is easily detected by its not being entirely volatilized by heat, which takes place at 380° Fah. It has no smell, emits no odour when burnt, and leaves on the palate a sweetish taste. Its specific gravity is 3·7.

I have sometimes thought it would be as well if arsenious acid could be dispensed with as a therapeutic agent, since, when injudiciously administered, death has often been the result; the whole of the abdominal viscera being then found in a high state of inflammation, and the lining membrane of the stomach and intestines eroded in patches. But it may be said the abuse of a remedy is no argument against its usefulness; and several practitioners, and those of note too, are in the constant habit of giving it as a tonic, in doses varying from five to ten grains daily, and frequently as much as twenty grains have been thus administered. Others employ it as a vermifuge.

Mr. H. Lepper, sen., strongly advocates its exhi-

bition in cases of debility consequent on catarrhal affections, in which the nasal discharge continues after the active stage of the disease has passed off, and there are fears of glanders supervening. He gives it in ten grain doses, mixed with the animal's food, every twelve hours, and he has communicated to me several cases in which the action of the agent has been most marked. He adds, "I believe it is from its being given in the form of powder in the food, that I am enabled, sometimes, to give it in double the above quantity, without having witnessed any ill-effects in a single instance during its use for many years."

By those of the old school it is extolled as a caustic, and a very powerful one doubtlessly it is; but there is this disadvantage attending its use,—we cannot control its action, and, oftentimes, a most extensive and painful sore is caused by it.

Occasionally it is resorted to for the eradication of warts, although a better plan is to extirpate them at once by the knife. When, however, this is inadmissible, one part of arsenious acid, in a state of fine powder, may be intimately mixed with four parts of lard, and a portion of the compound applied with friction over and around the excrescences, every other day, for three or four times. This will excite such powerful sloughing action, that, in about ten days, the warts will be thrown off.

A thousand parts of water at a mean temperature, according to Phillips, will take up from 9 to 12 parts in 36 hours. At the boiling point the same quantity of water dissolves 97 parts of the transparent kind; but 79 parts are precipitated on cooling, thus leaving 18 parts in solution. By this it appears that a much greater quantity of this acid is retained in solution when boiling water has been employed than when cold,—a fact as curious as it is inexplicable. Its solubility is increased by the addition of the alkali, soda or potassa, when a compound is formed, much used for the destruction of vermin in cattle and sheep, as *pediculi, acari, &c.*, for which the following form may be adopted:

SOLUTIO ARSENITIS POTASSÆ, *Solution of Arsenite of Potassa.*

Take of Arsenious Acid
    Carbonate of Potassa, of each half a pound;
    Water, twelve gallons.
Boil together for half an hour.

In the use of this solution Mr. Youatt says, "more care than is usually taken should be exercised, in order that the fluid may penetrate to every part of the skin; and which should be ensured by a previous washing with soft soap and water. The arsenic that necessarily remains about the wool when the water has dried

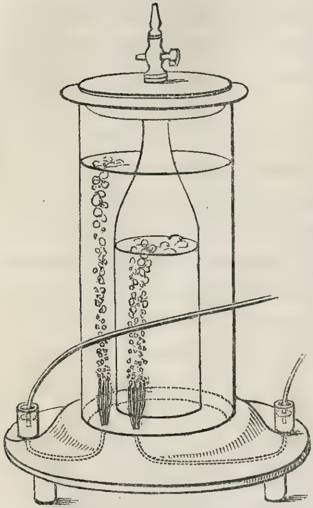
away would, probably, destroy the acari as fast as they are produced. When a greater quantity of arsenic has been used, or the sheep has been kept too long in the water, fatal consequences have occasionally ensued."

Tests.—Arsenious acid is entirely sublimed by heat. If mixed with charcoal, and heated, it emits an alliaceous odour, arising from the vaporization of the metal arsenicum, which, being conducted in a proper test tube and condensed, constitutes the test by reduction. Sulphuretted hydrogen added to its watery solution, slightly acidulated, throws down a yellow precipitate,—the *ter-sulphuret of arsenicum;* lime water, a white one,—*arsenite of lime;* the ammonio-sulphate of copper yields a green insoluble compound, —*arsenite of copper;* and the ammonio-nitrate of silver, a yellow one,—*arsenite of silver.* These constitute the tests by liquid re-agents; and to these may be added the test by nascent hydrogen. This last may be effected either in accordance with Mr. Marsh's plan or my own. By the former, hydrogen is generated from the suspected fluid by means of zinc and diluted sulphuric acid, when, if arsenic is present, it becomes *arseniuretted hydrogen.* This being allowed to escape through a small jet, is set on fire, and the flame caused to impinge on a piece of porcelain or glass, when the characteristic film of the metal arsenicum will be deposited. That this is arsenicum is to

be proved by dissolving the film in nitric acid by the aid of heat, drying it, and to the arsenic acid thus obtained adding a solution of the nitrate of silver, when a brick-red precipitate will be thrown down. This is the more necessary, since antimony and a few other metals being soluble in hydrogen, also give a metallic film.

The principal objections to this method are, that occasionally both zinc and sulphuric acid have been found to be contaminated with arsenic; the results, therefore, have proved deceptive. Both of these objections are obviated by my proposed plan, namely, that of causing the decomposition of the suspected fluid by means of galvanism. For this purpose the contents of the stomach, or portions of that viscus which have been acted on by the poison, are boiled in distilled water, adding a little carbonate or nitrate of potassa, and the solution thus obtained is introduced into a cylindrical glass vessel, within which is a cone-shaped one surmounted with a stop-cock and jet. The apparatus is now connected with a small galvanic battery, and the negative electrode made to communicate with the cone-shaped receiver, when, if arsenic be present in the fluid, arseniuretted hydrogen will be given off, which, after accumulating, is to be allowed to escape at the jet, and then inflamed. So delicate is this test, that a grain of arsenious acid dissolved in a gallon of water, afforded many metallic

films; and the dilution might have been carried further, but that it was thought to be sufficiently minute for judicial investigation.



Galvano-arsenical apparatus.

The subjoined woodcut will give a clearer idea of the apparatus than the most elaborate description.

These modes for the detection of arsenic it was thought would be superseded by the simple and ingenious method proposed by Professor Reinsch; which consists in acidulating the suspected fluid with hydrochloric acid, in the proportion of two fluid drachms of the acid to every eight ounces of fluid, then introducing a thin plate of polished copper, and applying heat. If arsenic be present, it will be deposited in the form of a delicate metallic crust, which, being separated, is to be introduced into a small glass tube; or should this be impracticable, the copper is to be cut into slips and placed at the bottom of the tube. The flame

of a spirit lamp being now applied, the characteristic crystals of arsenious acid will be obtained, which may be chased up and down the tube so as to determine their perfect formation, or, being dissolved in water, they will give the indications already spoken of by the application of the liquid re-agents to the solution.

Instead of copper foil Dr. Alfred Taylor substitutes fine copper gauze, containing 16,000 apertures to the square inch, by which an extent of surface exceedingly great is obtained. After the deposit of arsenicum has taken place on it, it is to be dried between folds of blotting paper, and then rolled into a small compass and introduced into the reduction tube. This plan he considers more convenient than any other; and of all the methods of detecting arsenic, there is none, he says, so simple, so speedy, or so easy of execution as this.

This test is certainly very delicate and of easy application, but the objections to it are, that antimony, zinc, bismuth, and tin, will also tarnish copper. This fact points out the necessity of a careful examination of the metallic film. Its oxidation and solution, with the application of certain re-agents, have already been adverted to; but Christison asks, What other metalliform substance but arsenic yields by heat and oxidation a white sublimate having triangular facets?

Incompatibles.—It is sometimes the case that this poisonous drug has been administered in too large a dose; and even when applied externally, serious consequences have supervened. The only counter-agent, on which it appears any reliance whatever can be placed, is the hydrated peroxide of iron, made by adding to a solution of the proto-sulphate of iron, nitric acid, boiling it, and then precipitating the oxide by water of ammonia. This is to be given in large quantities, newly prepared, and in the form of a soft paste. In the absence of this, the sulphuret of iron may be had recourse to.

Horses and cattle in the neighbourhood of copper-smelting works in Wales become the subjects of chronic diseases of the joints, and periosteal exostosis, of which several specimens are in the Museum of the Veterinary College, through inhaling the noxious arsenical and other fumes disengaged, or partaking of the herbage on which they have become condensed.

Dr. Shafhaeutl caused some of the fumes as they escaped to come into forcible contact with steam, when a solid compound was deposited on the cool surfaces of the chamber connected with the calcining furnace. It formed beautiful crystallised leaves or tables, and was found to consist of—

68·250	arsenious acid
27·643	sulphuric acid
3·029	protoxide of iron
0·420	oxide of copper
0·656	oxide of nickel
0·002	loss
100	

Mr. Rickards informs me that at St. Just, near Penzance, Cornwall, two or three instances of death in horses have fallen under his notice, which he has satisfactorily traced to the arsenical fumes given off from the tin-burning houses, he having clearly demonstrated the existence of arsenious acid in the stomach; cattle, in like manner, frequently die from the same cause. I am indebted to him for a sample of the impure arsenious acid, which is pulverulent and of a grey colour. He states that when the tin ore is mixed with copper it is then found necessary to pass it through the oven to remove the impurities, and to render it fit for smelting.

Arsenious acid being the only compound usually resorted to medicinally, I here venture to introduce to the notice of the profession another, the Iodide of Arsenicum, from the employment of which I anticipate much good will be found to result. It is obtained by heating together one part of metallic arsenic, and three or four parts of iodine. The iodide is of

a deep red colour, crystalline, and may be purified by sublimation. "According to Bette, a pure iodide of arsenic is obtained by fusing together about three parts finely-powdered arsenic and ten of iodine, digesting the mass in hot alcohol, filtering and setting aside to crystallize: it forms red lamellar crystals, which fuse and sublime when heated." (*Brande.*)

Composition.—1 atom arsenicum	=	75
3 atoms iodine 126 × 3	=	378
Equivalent		453

Qualities and Uses.—This, from its composition, will be seen to be a ter-iodide of the metal, occurring in crystals of a deep red colour. When acted on by water, it produces hydriodic and arsenious acids, and on evaporating the solution, a compound of arsenious acid and iodide of arsenic is obtained. Its action is that of an alterative tonic, and may be given in doses varying from five grains to twenty grains daily; commencing with the smaller quantity, and very gradually increasing the dose. It may be advantageously conjoined with the vegetable bitters, as gentian and some carminative, or given sprinkled over the animal's provender.

In only a comparatively few cases that I have been made acquainted with has this agent yet been tried, but the results have been such as warrant me to speak of it in terms of recommendation. I am in-

debted to Mr. J. H. Ramsbottom and Mr. G. Yeomans for communications detailing its beneficial action in cases simulating glanders, chronic nasal gleet, farcy, and œdema accompanied with debility; all of which diseases have, in their hands, yielded to it. I would suggest to our professional brethren in India a trial of this agent in Bursauttee.

Acidum Hydrochloricum.—*Hydrochloric Acid.*
Old Names: Spirit of Salt, Muriatic Acid.

This acid is disengaged by the action of sulphuric acid on common salt; hence the old name for this compound was *Spirit of Salt:* afterwards it was called *Muriatic Acid:* its more correct cognomen will presently be seen to be Hydrochloric acid. In order to obtain it,

Take of Dried Common Salt, 2 pounds;
Liquid Sulphuric Acid, by weight 20 ounces;
Water, 24 fluid ounces.

The sulphuric acid is to be diluted with one half of the water in a glass retort, and to it, when cold, the salt is to be added: the remainder of the water being placed in the receiver, the retort is to be attached, and heat applied by means of a sand-bath, when the hydrochloric acid will distil over.

Decomposition.—Dry common salt is a chloride of sodium; when dissolved in water, it becomes an hydrochlorate of soda, by the oxygen of the water

going to oxidize the sodium, and the hydrogen combining with the chlorine to form hydrochloric acid. When to this compound sulphuric acid is added, from the superior affinity it has for soda to that which hydrochloric acid has, it unites with it, forming a sulphate of soda, and hydrochloric acid is set free, which is absorbed by the water in the receiver. The following diagram will further explain the changes:—

	Materials.		*Products.*
60 Chloride of Sodium	Chlorine	= 36	Hydroch. Acid Gas = 37
	Sodium .	= 24	
49 Sulph. Acid (40 dry Acid, 9 Water)	Hydrogen .	= 1	
	Oxygen .	= 8	
	Sulphuric Acid	= 40	Sulphate of Soda = 72

The *Composition* of hydrochloric acid gas is thus shown to be,

1 atom chlorine	=	36
1 ,, hydrogen	=	1
Equivalent .		37

Water has so great an affinity for this gas that it can absorb 480 times its bulk of it, considerable heat being produced during the combination. The resulting liquid acid should have a specific gravity of 1·16, which according to Phillips, consists of,

Hydrochloric acid gas	34
Water	66
	100

Qualities and Uses.—When perfectly pure, liquid hydrochloric acid is transparent and colourless; but as prepared on a large scale it has a yellowish colour, arising from the presence either of a little free chlorine, or some oxide of iron. It has all the characters of an acid; emits copious fumes on exposure to the air, and erodes animal and vegetable substances. With the metal it forms metallic chlorides, the hydrogen being liberated. Its saline compounds are termed hydrochlorates, and its specific gravity varies with the quantity of real acid it contains.

Hydrochloric acid is a tonic, an antiseptic, a caustic, and a lithontriptic. As the first, it is seldom given; as the second, it may be used externally in the form of lotion, being largely diluted with water. Its properties in this respect, probably, depend on the presence of chlorine. In an undiluted state it will decompose animal matter, blanching it, and destroying any fœtor that may exist. It may, therefore, be employed to touch the surfaces of ulcers that have taken on unhealthy action. The sesquichloride, or *butyr of antimony* of the old school, owes its value to this acid. As a lithontriptic, or dissolvent of calcareous concretions in the bladder, cases have fallen under my notice in which its employment has been attended with benefit. One case occurred in the practice of the late Mr. G. Draper; another in that of Mr. J. Beeson; and in vol. II of 'The Transactions of

the Veterinary Medical Association,' p. 113, Mr. R. H. Hutton has recorded a case, in which this agent, having been given in large doses, caused a calculus, previously ascertained to exist entire, to come away in fragments by the urethra.

In Mr. Beeson's case, it had the effect of disintegrating the calculus, so that, on performing the operation of lithotomy, it broke into pieces. In that of Mr. Draper's, I am inclined to think the particles had not become sufficiently aggregated to constitute a perfect calculus; but the sabulous matter voided was immense, and the irritation caused by it had brought the animal down almost to the last stage of emaciation. He recovered, however, by the steady administration of this acid in two-drachm doses in a a pint of water twice in the day. If we bear in mind that the mineral acids do not undergo assimilation, and the calcareous deposits in the bladder of the horse consist principally of the earthy carbonates, it is not too much to anticipate that such should be the result. As a lithontriptic, it may be given in doses of two or more drachms twice a day, largely diluted with water.

Tests.—Colourless. Entirely evaporated by heat. Mixed with distilled water, neither chloride of barium, nor ammonia, nor its sesqui-carbonate, throws down any precipitate; which proves that no sulphuric acid nor any metallic oxide is in solution. It does not

act on gold, nor destroy the colour of the solution of sulphate of indigo, which indicates the absence of free chlorine. 100 grains saturate 132 grains of the crystallised carbonate of soda. In solution it is precipitated by the nitrate of silver, when a *chloride of silver* is formed. Its fumes are rendered more manifest by ammonia.

Incompatibles.—Alkalies and their carbonates, most metallic oxides, the potassio-tartrate of antimony, nitrate of silver, and acetate of lead.

ACIDUM HYDROCYANICUM DILUTUM, *Diluted Hydrocyanic Acid.* Old name: Prussic Acid.

Take of Cyanide of Silver, 40 grains;
Hydrochloric acid (sp. gr. 1·129) 40 minims;
Distilled water, 7 fluid drachms 20 minims.

Mix the hydrochloric acid and the water, then add the cyanide; shake together in a well-stopped bottle, and, after a short interval, pour off the clear liquor into another vessel, which keep for use, the access of light being prevented.

I have chosen this extemporaneous process of preparing dilute hydrocyanic acid, as proposed by the late Mr. Everitt, in preference to the form given in the Pharmacopœia of the College of Physicians (by whom, nevertheless, this is sanctioned), because it is an agent not yet generally introduced into veterinary practice, nor one in every day request; while it is

very apt, when exposed to light, or not carefully kept, to undergo change. Besides which, it is improbable that the veterinary surgeon will ever make this compound as there directed.

Decomposition.—Hydrochloric acid, composed of hydrogen and chlorine, being added to cyanide of silver, consisting of cyanogen and silver, mutually decompose each other; an insoluble chloride of silver is precipitated, and hydrocyanic acid remains in solution with the water. The reaction is explained by the following diagram:—

134 Cyanide of Silver	Cyanogen = 26	Hydrocyanic Acid = 27
	Silver . = 108	
37 Hydrochloric Acid	Hydrogen = 1	
	Chlorine = 36	Chloride Silver = 14

Composition.—The ultimate elements of pure hydrocyanic acid are 2 equiv. carbon = 12; 1 equiv. nitrogen = 14; and 1 hydrogen = 1 = 27. Usually it is given as consisting of

1 atom cyanogen =	26
1 ,, hydrogen =	1
Equivalent	27

By the Pharmacopœia it is directed to be prepared of such strength that 2 parts of real acid shall be contained in 100 parts of the dilute acid.

Properties and Uses.—Dilute hydrocyanic acid is

a transparent liquid, "free from colour, and goes off entirely in vapour by heat, exhaling its peculiar odour. It imparts to litmus a slight fugacious red colour; by the addition of hydro-sulphuric acid it is not coloured:" this detects the existence of any metallic matter; while the presence of any other acid is shown by the permanent redness of the litmus paper. These may also be taken as tests of its purity.

CONCENTRATED OR ANHYDROUS hydrocyanic acid is obtained by the action of strong liquid hydrochloric acid on the bicyanide of mercury. The vapour, which rises on the application of heat, is passed over, first, carbonate of lime, in order to deprive it of any hydrochloric acid; and then over chloride of calcium, to remove any water. The receiver should be kept in a freezing mixture. It is this acid which acts so energetically on the animal economy; since a few drops suffice to kill large animals; and smaller ones are destroyed by merely passing a camel's hair pencil dipped in it over the eye-ball. Its vapour is even more poisonous.

As it is the *dilute acid*, however, which is employed medicinally, I will describe its action:—It is that of a powerful sedative, and may be given to the horse in doses of from ʒss to ʒj, and even more, for it is surprising what large doses, when gradually increased, this animal will bear. I have administered four fluid drachms at one time; and, although the effects

were very violent, there being a loss of consciousness, with convulsive movements, stertorous breathing, and accelerated pulse; yet these soon passed away, and then its sedative influence was shown, by the pulse becoming lessened in frequency, and the vital powers much depressed. It has been given in cases of gastric and pulmonary irritation accompanied with cough; also in carditis; and by some it is advocated as a vermifuge. Slowly thrown up as an enema, in quantities of a drachm two or three times in the day, mixed with about a quart of water, it has been found to lessen the muscular contractions in tetanus. The impression of the first injection on the nervous system is often very powerful; but subsequent ones produce comparatively little action that is apparent. It may be exhibited by the mouth in the same disease, after the bowels have been acted upon by a purgative, combining it with other sedatives, for the purpose of tranquillising the excitement of the motor nerves, thus allaying the general muscular spasm. It has been employed externally to lessen cutaneous irritation; and Mr. Ainslie found a lotion, formed by adding ʒij to ʒiij of the acid to a pint of distilled water, most effectual in subduing the itching accompanying impetiginous diseases in dogs. Experiments, however, are still wanting to establish its use as a general medicament in veterinary practice.

Tests.—For its purity, see *Properties, &c.* Its

presence is indicated by its peculiar odour, which resembles that of bitter almonds, or the peach blossom. If the sulphate of the protoxide of copper is added to its solution rendered slightly alkaline by potassa, a greenish precipitate will be deposited. This is changed nearly white by hydrochloric acid, and is the *cyanide of copper.* The sulphate of the protoxide of iron throws down a greyish-green precipitate, which, on the addition of sulphuric acid, becomes of a deep blue colour—the *ferrocyanate of the peroxide of iron.* Nitrate of silver gives a white precipitate,—*the cyanide of silver,* which on being heated yields cyanogen.

Incompatibles.—Most salifiable bases decompose it, owing to the weak affinity which binds its elements together. When mixed with metallic oxides, its hydrogen combines with the oxygen, forming water, and the cyanogen unites with the metal, giving rise to a cyanide.

ACIDUM NITRICUM.—*Nitric Acid.* Old Names: Aqua fortis. Single and Double Nitrous Acid.

This acid is obtained by the action of sulphuric acid on the nitrate of potassa.

Take of Dried Nitrate of Potassa,
Liquid Sulphuric Acid, of each, by weight, two pounds.

Mix them together in a glass retort, and distil the

nitric acid, by means of a sand-bath, into a receiver which is kept cool.

Decomposition.—The change which here takes place is easily comprehended. Sulphuric acid possesses a greater affinity for the base, potassa, than nitric acid does; consequently, when added to the nitrate of potassa, and aided by a high temperature, it effects its decomposition. The sulphuric acid combines with the potassa, and forms a sulphate of potassa, which remains behind in the retort; while the water unites with the nitric acid which is set free, and these, passing over into the receiver, constitute liquid nitric acid.

A diagram may further illustrate this; it being remembered, that two equivalents of sulphuric acid are employed to decompose one equivalent of nitrate of potassa: for the purpose of explanation, however, the proportions are given as four and two.

2 eq. Nitrate of Potassa	2 equiv.	Nitric Acid	$54 \times 2 = 108$	135 liq. Nitric Acid
	2 ,,	Potassa	$48 \times 2 = 96$	
4 eq. Sulph. Acid of Commerce	3 ,,	Water	$9 \times 3 = 27$	
	2 ,,	Water	$9 \times 2 = 18$	
	4 ,,	dry Sulph. Acid	$40 \times 4 = 160$	274 Bisulphate of Potassa.

The above gives an acid thus composed:—

2 atoms	nitric acid	$54 \times 2 =$	108
3 ,,	water . . .	$9 \times 3 =$	27
			135

Or, if the half be taken,

1	atom of nitric acid	=	54
$1\frac{1}{2}$	,, water . . .	=	13·5
			67·5

This has a specific gravity of 1·5033 to 1·504.

It rarely, however, occurs of this strength in the shops; the proportion of water being commonly doubled. Occasionally, also, a little sulphuric and hydrochloric acids are present, which may be detected by means of the nitrates of baryta and silver, which throw down a white precipitate; but these seldom affect the medicinal properties of the compound.

Composition of dry nitric acid:

1 atom nitrogen	=	14
5 atoms oxygen 8×5	=	40
Equivalent		54

In this state it is capable of existing only in combination with some base.

Qualities and Uses.—Liquid nitric acid is a limpid fluid, of a palish straw colour, possessing strong corrosive qualities, emitting suffocating fumes, and attracting moisture from the air. It should, therefore, be kept in bottles having well-ground stoppers. Its specific gravity is given as it is directed to be prepared by the College of Physicians; but, of

course, this will vary with the quantity of real acid the water contains.

Aqua fortis is merely diluted nitric acid, prepared by the distillation of nitre and diluted sulphuric acid. According to Dr. Ure, it contains only one-fourth as much real acid as the strong nitric acid, and double aqua fortis one half as much.

Nitric acid is a valuable and active caustic and antiseptic. It quickly destroys animal substances, and therefore may be advantageously made use of when fungous excrescences or luxurious growths require reduction. For this purpose a pledget of tow, or, what would be much better, some fibrous asbestos, attached to the end of a stick, may be dipped in the acid, and firmly pressed on the surface; or, should this be extensive, a layer of tow saturated with the acid may be laid on the part, as is commonly done in severe cases of canker. On the removal of this, it will be found that the surface with which the acid has come into contact is deadened; sloughing will then ensue, and healthy granulations be thrown out. Its fluidity is the only objection to its general employment; but with me I confess that it is a favorite escharotic. The nitrate of silver owes its valuable properties to this acid.

As an antiseptic, a very dilute solution, in the proportion of two or more drachms to a pint of water, may be employed for indolent or sphacelated wounds

and ulcers. This will serve both to correct the fetor, and excite the contiguous parts to healthy action. In this respect, however, it, perhaps, must yield to the compounds of chlorine. I am not aware that it is administered internally; if it were, its action would be that of a tonic and astringent.

Tests.—It leaves no residuum on heat being applied. Nitrate of silver affords no precipitate, indicating the absence of chlorine and hydrochloric acid; nor does the chloride of barium, which it would do were sulphuric acid or any of the sulphates present. It changes the cuticle yellow, which tint is heightened by an alkali. When diluted and boiled on copper filings, it forms a blue solution, evolving copious orange-coloured fumes. About 217 grains of the crystals of carbonate of soda are neutralised by 100 grains of this acid.

Incompatibles.—I have before said that I am not aware of its being given internally; but it would be incompatible with the metallic oxides and their carbonates, the alkalis, the acetates of lead, and potassa, and the sulphate of iron. It also decomposes the sulphurets. Mixed with hydrochloric acid, both suffer decomposition, and chlorine and nitrous acid are the result: these in combination, form the *aqua regia* or *nitro-hydrochloric acid,* which possesses the power of dissolving gold and platinum. The other metals are readily acted on by dilute nitric acid,

when nitrous acid is given off, and nitrates of their oxides are formed.

It is employed as a pharmaceutical agent in the formation of nitrate of silver, the ointment of the nitrate of mercury, and the spirit of nitric ether.

Acidum Sulphuricum, *Sulphuric Acid.*

Old Names: Oil of Vitriol, Vitriolic Acid.

Occasionally this acid is found in the neighbourhood of volcanoes, either in a concrete state or that of solution. As an article of commerce, it is largely made in this country by the combustion of eight parts of sulphur and one part of nitrate of potassa, in chambers lined with lead, having a stratum of water covering the floor one or two inches in depth. Sometimes iron pyrites (bisulphuret of iron) is substituted for sulphur, which accounts for the frequent contamination of this acid with arsenic.

A modification of this, the old plan for obtaining sulphuric acid, has been recently adopted by manufacturing chemists. It is as follows:—Sulphur is burned on an iron plate in a furnace, and the gas given off is conveyed by a pipe into a leaden chamber, the bottom of which is covered with water. After combustion has been kept up for some hours, the air being admitted by openings in the door of the furnace, an iron pot, containing nitrate of potash or soda

and sulphuric acid, is introduced, and steam is at the same time allowed to pass into the chamber. By a mutual re-action of the generated acids on the steam, sulphuric acid is formed, which is absorbed by the water at the bottom of the chamber.

Decomposition.—In whichever way sulphuric acid is formed, the *rationale* of the process does not differ materially. The sulphur by burning yields sulphurous acid gas, and the nitrate of potassa nitrous acid gas; these two, uniting with the watery vapour (condensed steam) in the chamber, form a solid crystalline compound, which is precipitated into the water, and there undergoes decomposition. The nitrous acid imparts two atoms of its oxygen to two equivalents of sulphurous acid, converting them into sulphuric acid, which is absorbed by the water; while the nitric oxide that remains, rising into the chamber in the state of gas, becomes again nitrous acid at the expense of the oxygen of the air, and, descending, mingles with more sulphurous acid gas and watery vapour, and these form the like solid compound as at the first, and which undergoes the same changes. These combinations and decompositions continue until all the gaseous products are consumed, and the water is charged with sulphuric acid. It is then concentrated by boiling, first in leaden boilers, and subsequently in glass or platinum retorts, until it attains the required specific gravity.

It is afterwards put into large globular glass vessels, enveloped with wicker work, called carboys.

The following diagram will further illustrate the changes which take place in its formation:

	Materials.		*Products.*	
	Nitrogen .	14	Nitric Oxide .	30
	Oxygen .	8		
46 Nitrous Acid	Oxygen .	8		
	Oxygen .	8		
	Oxygen .	8		
Sulphurous Acid . .		= 32	Sulphuric Acid .	40
Sulphurous Acid . .		= 32	Sulphuric Acid .	40

Another method of obtaining this acid is by forming the sulphurous and nitric acid gases in separate chambers, and allowing them to enter a third, containing watery vapour. Considerable quantities are made on the Continent by exposing the sulphate of iron to heat in close vessels, when the acid distils over, and is collected in a receiver. The old name of *vitriolic acid* was derived from this circumstance, sulphate of iron being then designated vitriolated iron, or green vitriol. The term *oil* of vitriol was given to it from its apparent viscidity.

Composition.—1 atom sulphur . $= 16$
3 atoms oxygen $8 \times 3 = 24$

Equivalent . 40

This is designated dry or anhydrous sulphuric acid. Concentrated liquid sulphuric acid is composed of

1	atom dry acid	=	40
1	,, water	=	9
	Equivalent	.	49

As an article of commerce, however, the water is in the proportion of five to four of the dry acid.

Properties and Uses.—Sulphuric acid is a dense, colourless, transparent fluid, inodorous, emitting no fumes, having an extremely sour taste, and a specific gravity of 1·845 when pure. This seldom is the case, the acid of commerce being frequently impure from the presence of the sulphates of potassa and lead. A small quantity of these is the result of the formation of the acid; but they are often added to increase its specific gravity. According to Dr. Ure, if 500 parts of the acid contain on evaporation more than five grains of saline matter, it is adulterated. It possesses so great an affinity for water, that, if exposed to the air for a few months, it is said to double its weight. If suddenly mixed with this fluid, it gives out much heat. It likewise chars animal and vegetable substances, which communicate to it a brown tint. These circumstances point out the necessity of keeping this acid in bottles having closely-ground glass or earthen stoppers. It becomes solid at—15° and boils at 620° Fah. These points, however, vary

with the specific gravity of the fluid. The point of congelation is much higher than that of water, if the acid is diluted with 12 or 13 per cent. of water. Of this I witnessed a proof some years since, when during a severe winter, carboy after carboy was burst by the expansion of the acid on its assuming the crystalline form.

It acts on the skin as a powerful caustic, and communicates an unctious feeling to the touch, from a dissolution of the cuticle: soon after this a burning pain is experienced, arising from the nervous fibrillæ being laid bare. Made into a paste with sulphur it has been used for the extirpation of warts. It has been said that the caustic effects of the concentrated mineral acids are referable to the affinity which they possess for the elements of water: they unite with the hydrogen and oxygen, char or precipitate the carbon, and disengage the nitrogen.

An ointment composed of one part of this acid and twelve of lard has been advocated in mange. Sometimes sulphuric acid is introduced into blistering compounds, for the purpose of increasing their potency,—a practice which deserves the severest reprobation.

Internally administered, it is a tonic and an astringent, and may be given in doses of from ʒj to ʒij, largely diluted with water, or some bitter vegetable infusion; but, as a therapeutic agent, it is best when combined with certain bases, such as the oxides of

iron, of copper, and of zinc, forming the sulphates of these metals.

Wagoners frequently give it to horses sprinkling it over their provender. Sometimes the quantity administered by them is so great as to be productive of fatal consequences. I knew a team of four horses thus destroyed. The antidotes would be magnesia, or the alkaline carbonates, or soap, exhibited in large quantities of water. The indications of its having been employed are the symptoms which accompany gastro-enteritis; and in addition to these, the tongue, the inside of the mouth, &c., will appear wrinkled, and of a brownish colour, and the teeth blackened.

On the fixed oils it exerts a saponifying influence. During its action sulphurous acid fumes are disengaged; glycerine is formed, with sulpho-margaric, sulpho-stearic, and sulpho-oleic acids. A compound of this kind constitutes the *black oils* of the farriers, a form for which has been given by Mr. Percivall in his 'Hippo-pathology.' It is used as a digestive.

Take of Olive Oil . . . . Oj,
Oil of Turpentine . ℥ij.

Mix, and add six drachms of sulphuric acid very gradually, leaving the stopper out of the bottle until the heat evolved has passed off.

Tests.—Colourless. By evaporation a residuum should remain, not exceeding the four hundredth part of its weight. This is sulphate of lead and sul-

phate of potassa. When diluted with water, sulphuretted hydrogen should afford no colour, which proves the absence of all metallic impregnation. The presence of sulphuric acid is indicated by the soluble barytic salts. Its action on the cuticle, in small quantities, has been before adverted to: it imparts a saponaceous feel, from its decomposing the animal matter, and at the same time communicates warmth.

Incompatibles.—As sulphuric acid combines with most of the metallic oxides, it is considered incompatible with them. On the metals themselves, at ordinary temperatures, it exerts but little action: but at the boiling point, or by dilution, this becomes energetic, and sulphates are formed. It decomposes the carbonates and the acetates; and is largely employed as a pharmaceutical agent, on account of its affinity for the salifiable bases being great. This is markedly seen in the formation of nitric and hydrochloric acids, as already given.

ADEPS, *Fat.* Vulgo: Hogs' Lard.

This is obtained from the adipose substance about the flank of the hog, for which purpose it is freed from the membranes and vessels with which it is connected, and, being cut into small pieces, is well washed and then melted with the addition of a little water, care being taken that the heat is not too

intense. In its fluid state it is run into bladders and small casks, and as it cools it concretes.

Chemical Composition.—The ultimate elements of lard are the same as fixed oils generally. According to Chevreul, 100 parts contain

Carbon	79·098
Hydrogen	11·146
Oxygen	9·756
	100

Braconnot has given, as the proximate analysis of lard,

Stearine	38
Margarine	62
Elaine	
	100

These principles are met with in all fats and oils, whether animal or vegetable, varying in their proportions. They are compounded of certain fatty acids, that take their names from the principle from which they are obtained, united with a base named glycerine, a sweet substance, procured, by means of dilute sulphuric acid, from the alkaline mother-water from which soap has been concreted.

Elaine or oleine, stearine and margarine, may be separated by subjecting lard or oil that has been congealed by cold to powerful and continued pressure between folds of bibulous paper at a low degree of heat, when the elaine will be absorbed, and the stearine remain behind in the form of a granular mass.

Proportions and Uses.—Lard is an emollient, and constitutes the basis of most ointments. It should be tasteless, inodorous, soft, and colourless, specific gravity ·9302. It melts at between 78° and 86°; acquires rancidity by long exposure to the air, whence it abstracts oxygen, becomes yellow, and forms a peculiar acid called the sebacic, which may be removed by repeated washings in water. The strong acids decompose it. It is insoluble in water and dilute alcohol, but may be made to unite with them by the intervention of an alkali, with which it forms saponaceous compounds. By ether and the volatile oils it is readily dissolved.

Aloes Extractum, *Extract of Aloes.* Aloes.

The inspissated juice of the leaves of the aloe plant. Many kinds of this extract are met with in commerce, but it is probable that their value depends more upon the mode of procuration and culture than upon varieties of the plant.

The genus aloe includes a numerous family of plants of a half-shrubby character, having thick and succulent leaves, beset with teeth on their edges, and long fibrous roots, which serve rather as means of retention than organs of nutrition. They are all inhabitants of tropical climates. The southern parts of Africa abound with them; thence, more than two hundred years since, they were introduced into our

West India islands, where they may be said to be now naturalised.

The extracts used in veterinary practice are three, and these are probably obtained from distinct species of the plant:

1. Aloë Spicata, *Spiked Aloe;* Officinal, Aloes Spicatæ Extractum, *Extract of the Spiked Aloe.*

The Spiked aloe yields the extract known by the name of Cape aloes. The plant rises with a thick round stem, three or four feet in height, from which fleshy and tapering leaves proceed two feet long, and abounding with a clammy juice, since they respire but little, yet absorb much moisture. The extract is procured by cutting the leaves off transversely close to their insertion, and then disposing them in tubs in such a manner that the juice may flow out. Expression is occasionally had recourse to, but an inferior kind of aloes is then obtained, from an admixture of vegetable mucus. By boiling the leaves a still commoner variety is procured. The grosser feculent matter is now allowed to subside from the juice, after which inspissation is carried on by the aid of heat, until the whole acquires a fit consistence, when it is poured into chests, principally for exportation.

2. Aloë de Mochâ, *Mocha Aloes.* Writers on materia medica say but little respecting this extract, and that little not in commendation. I have, however, no doubt but that nearly all that has been sold

by druggists of late years in their shops, under the name of Socotrine aloes, is a fine kind of Mocha, since the produce of the Isle of Socotra finds its way into Bombay. The late Mr. J. Hughes, of Calcutta, informed me that he always purchased his aloes from the native merchants, in original packages, consisting of the skin of a goat; that he found the extract very active, but impure, and was obliged before using it to melt and strain it. Mr. C. Jackson, late of Madras, forwarded to me a sample of East Indian aloes, which he states to be equal in action to the Barbadoes, and procured from the *aloë perfoliata* of Linnæus, this plant being identical with the *aloë socotrina;* and, since this, I have been favoured with specimens from Mr. T. Aston, of the Hon. E.I.C. Service. Indeed, it would appear that from the interior of India many kinds of aloes are obtained, all of which are met with in the market under the name of East India or Bombay aloes.

To the Mocha extract my attention was first directed by Messrs. T. W. Mayer and C. Snewing, in the year 1840, when I made it the subject of a series of experiments, contrasting it with the Cape extract, which was then alone used at the College, and from my published Report I select the following remarks:

The characters of the Mocha or Bombay aloes are: Colour, of a dull liver-brown; fracture, smooth and

opaque; odour, aromatic; taste, bitter and nauseous; powder, yellowish brown.

In all the samples I have seen there are many impurities mixed with the drug, apparently the result of a want of care in its preparation. In a sample sent me, designated "beautiful," and with which I am told by my friend that "he cannot, of course, supply me in any very large quantity," there are many stones and much dirt. He also says that he has "frequently met with a good deal of iron and other substances." Doubtless this is an attempt at fraud, the same thing having been practised with the Cape aloes.

It is imported in cases and puncheons. The cases contain about one cwt. each; the puncheons from four to five cwt. A very large quantity was imported from Bombay many years ago, and no one would purchase it, on account of its being then unknown to the drug trade; and the probability is, that by far the greater proportion still remains bonded in London, although much has lately found its way into the shops, and the article is rather pushed by many houses.

Its composition I find to be—

Soluble extractive . .	80
Resinous matter . .	20
	100

This is independent of impurities, which, in the specimen I analysed, amounted to nearly three per cent.

It will be observed that, as it respects the amount of the active principle, it is almost equal to that obtainable from the Barbadoes extract. The sample was an average one. I have met with some containing as much as ten per cent. of impurities. From a good specimen of the Cape extract I procured but sixty per cent. of extractive matter ; the quantity of impurities, however, was much less in the Cape than in the Mocha extract. The difference in amount of the active principle in the vegetable is, perhaps, referable to climate.

The action of the two extracts—the Bombay and the Cape—will be best shown by contrast in the following Tables. The opportunity afforded me was such as does not often occur in private practice. Twelve doses of purgative medicine were administered in one day, and all the horses were under my observation. It would therefore have been a disgrace had I not availed myself of it. The quantity given to each horse was six drachms. The horses were all previously prepared by mashes given overnight and an abstinence from hay, this being the common practice of the College. Some had exercise on the following morning, and others had not. This arose from the nature of the lameness or disease under which they were labouring.

The form of combination was that usually adopted here, no carminative being added ; and it appears

that none is required, for there was not, even when its action was the most powerful, the slightest appearance of pain, or of constitutional disturbance, beyond that always induced by a purgative.

No.	*Time required to cause action.*	*Exercised or not.*	*Evacuations.*	*Action.*	*Length of time kept up.*
CAPE ALOETIC EXTRACT.					
1	19 hours	Exercised	Several	Free	The next morning the fæces were becoming consolidated
2	24 ditto	Ditto	3 or 4	Free	Ditto
3	24 ditto	No exercise	Ditto	Moderate	Ditto
4	27 ditto	Exercised	Ditto	Ditto	Ditto
5	27 ditto	Ditto	Ditto	Ditto	Ditto
6	Scarcely acted at all	No exercise	—	—	—
BOMBAY ALOETIC EXTRACT.					
1	15 hours	No exercise	Many	Free	Purging continued throughout the next day
2	17 ditto	Exercised	3 or 4	Moderate	Fæcal matter the next morning still in a relaxed state
3	17 ditto	No exercise	5 or 6	Free	Ditto
4	18 ditto	Ditto	3 or 4	Moderate	Ditto
5	20 ditto	Ditto	5 or 6	Ditto	Ditto
6	27 ditto	Ditto	Relaxed only	—	Next morning fæces becoming consolidated.

It will be seen, by the preceding Table, that the preponderance is decidedly in favour of the Bombay extract. The fæces were in all cases more fluid than in those in which the Cape extract had been administered, and the action on the bowels appeared to be longer continued. No. 1 of the Cape, which operated both soonest and freest, was a small horse; while No. 1 of the Mocha, the action of which much exceeded that of the Cape, was a large horse, and, from labouring under an incised wound in the hock, he could not be exercised. On the third day the physic had set. No. 6 in the same stable, in which the fæcal matter was relaxed only, was an animal that refused mashes, and would drink very little water; the groom also reported that he was always with difficulty purged.

It must not be thought that these are the only instances in which I have tested this extract. It has frequently been given by me, and with almost uniform success, both previous and subsequently to this opportunity presenting itself for drawing so fair an inference. Its value as a cathartic is therefore, I think, established.

Druggists have lately introduced a finer kind of Mocha extract, made so by melting and straining of the drug. This is certainly opening a door for fraud, as inferior Barbadoes extract and the Cape may now be melted together, and it would be extremely diffi-

cult to detect the admixture. Besides which, by long coction, bitter extractive is rendered nearly inert; I should therefore prefer the genuine unmelted Mocha aloes to this. Dr. Pereira, speaking of this kind of aloes, says, that "recently it has been imported from Muscat in chests, containing nearly two cwt. each. It occurs in large irregular masses, opaque and black externally. Internally, its fracture in places resembles Barbadoes aloes; in others, Socotrine; and here and there we find portions having the transparency and resinous appearance of the Cape extract: it is intermixed with sand, stones, strings, &c."

3. Aloë Vulgaris, *Common Aloe;* Officinal, Aloes Vulgaris Extractum, *Extract of the Common Aloe.*

This appears to be the true aloe of the ancients. From it is derived the Barbadoes extract, by a course of procedure similar to that which is resorted to for obtaining the Cape aloes.

The plants are chosen when they are two or three years old, and they will be productive for ten or twelve years, if properly manured. They appear to to be short-stemmed; their large and very succulent leaves springing apparently from the surface of the soil, and filled to saturation with juice. These being grasped by the labourers, are cut off at their bases, and arranged in vessels in such a manner, that their natural reservoirs soon become emptied. The leaves are afterwards used as manure, and the juice is taken

to the boiling house for evaporation. This is carried on until the extract acquires the viscidity of honey, when it is run into calabashes or empty gourd shells, capable of containing from 20 to 60, or even more pounds weight, and in this state it is imported into the market. An inferior quality is sent over in casks. That which in books is described as *caballine* or *horse aloes*, and said to be used by farriers, is thought to be the refuse after the making of the Barbadoes extract, but I have never met with it.

Preference is given by most private practitioners to the Barbadoes extract, and the Veterinary College has returned to its employment: this has in part arisen from much uncertainty attending the *melted* Mocha extract. Although it is extremely difficult to divest the mind of an early impression, yet I feel assured that, if care be taken in the selection of the drug, the animal properly prepared, and the dose duly apportioned, the Cape and Mocha extracts will be found quite as efficacious as the more expensive Barbadoes. The Mocha extract being not yet generally employed, it will, perhaps, be sufficient if the two kinds that have been so long used in veterinary medicine are somewhat more dwelt upon. I allude to the Barbadoes and Cape extracts.

The external characters of the two should be studied; for although much is said about the sophistication of aloes with resin, ivory black, &c., I believe

that the greatest fraud practised is the substitution of the one extract for the other, or, what is by far more common, a mixture of the two is sold as the Barbadoes extract, which is known in the shops by the name of *melted aloes.* In veterinary practice such a combination will be found to equal in action the Barbadoes extract when given alone; thus considerably lessening the expense attendant on the use of the latter. The proportions may be equal.

The following contrasted characters may, perhaps, assist the inexperienced. The *taste* of both is intensely bitter and nauseous.

	BARBADOES.	CAPE.
COLOUR . .	Brown or liver . . .	Darker, approaching to black.
FRACTURE .	Dull and granular .	Resinous and splintery.
ODOUR . . .	Stronger, and more aromatic than the Cape.	
POWDER . .	Greenish-yellow . .	Yellow.

The dulness of the Barbadoes extract appears to depend upon the presence of a little water, since, if this be dissipated by boiling, it assumes a bright, shining aspect. Its aroma is best developed by first breathing on it.

Chemical Composition and Uses.—In the first there remains much to be understood, and many analyses have been made. In 1850-51, Messrs. Smith, of Edinburgh, accidentally discovered a substance in Barbadoes aloes called by them *aloin,* to which the

activity of the drug has been by them referred. A cold watery solution having been made, so as to obtain an aqueous extract of aloes; after evaporating the liquor in vacuo, and the syrupy liquid had become cold, it was set aside for a few days, when, on examination, it was found loaded with a mass of granular crystalline matter. On purification, this appeared to be the cathartic principle of aloes. Other means were subsequently resorted to for its procuration; but the most facile seems to be that of simply mixing the "Socotrine aloe juice," an article imported into the market in casks, containing about 6 cwt. each, the consistence of which is that of treacle, being the unboiled juice of the plant, with either rectified or proof spirit, and collecting and drying the precipitate. As, however, in the ordinary extracts met with in commerce, we have the activity of the dry sufficiently concentrated for veterinary purposes, I opine *aloin* will rarely be resorted to by us.

By the majority of authors, aloes is described as consisting of vegetable mucus, resin, and extractive matter, these varying in their proportions in the different kinds of extract, and the value of each depending upon the quantity of the last principle, as in this the activity of the drug resides. M. Braconnot conceives aloes to be a substance *sui generis*, to which he has given the name of *bitter resin*.

Tromsdorff concludes, from his analyses, that the socotrine extract consists of

A saponaceous bitter principle .	75 parts
Resinous matter	25
	100

The Barbadoes of

A saponaceous bitter principle .	81·25
Resinous matter	6·25
Vegetable Albumen	12·50
	100

It being considered by most writers on materia medica that it is the same plant which yields both the Socotrine and the Cape extracts, the first analysis may be accepted as affording the constituents of both, allowing for the want of care in the preparation of the latter, and something, perhaps, for cultivation. The presence of vegetable albumen—besides the difference in the quantity of the active principle—is the chief distinctive between the Cape and the Barbadoes aloes; while the nearly perfect solubility of one in boiling water, and the imperfect solubility of the other, is a means, when others fail, of detecting the substitution of one for the other. This simple test will also render evident any other sophistication.

A knowledge of the composition of these extracts gives us some clue to the comparative dose of each.

It has been said that six drachms of the Barbadoes are equal to seven drachms of the Cape; and although analysis would hardly warrant this difference, yet, for practical purposes, it may be allowed.

I have not by experiment found that the one is either more certain or quicker in its operation than the other; but I have ascertained that the action of the bowels is kept up longer by the Barbadoes extract than by the Cape; and also that by a mixture of the two, in the proportion of two parts of the latter to one part of the former, or, at most, equal weights of each, is nearly, if not quite, as effectual in producing purgative action as the former alone.

Aloes is said, from the slowness with which it undergoes solution in the alimentary canal, to exert its influence principally upon the colon and rectum. That this is the case in the horse I have very many doubts. In examinations after death caused by superpurgation from an overdose of aloes, the whole of the mucous lining of the intestines has been found inflamed, and particularly that of the cæcum and colon, the *rectum* not being involved in so marked a degree.

Some persons are of opinion that the action of this drug is primarily on the liver. With this I do not concur. It is only a part, and a small part too, of the manner in which its effects are produced. Perhaps the forms in which these extracts are administered by veterinary surgeons modify their action.

Those who advocate the combination of alkaline compounds with them certainly alter their general influence. It is true that, by these additions, they are rendered more soluble, and hence their action is quickened; but at the same time their purgative properties are lessened, and they cease to operate specifically on the large intestines. This latter circumstance I conceive to be an advantage gained, as is unquestionably the first; while the other alteration, by a little experience, may be easily provided against.

Some persons have objected to the addition of the alkalies to aloetic compounds, on other grounds; that of their being likely to divert the action of these agents from the bowels to the kidneys; yet there is a view in which this union may be defended—they saponify the resinous constituent of the drug, and the active principle being thus rendered partially soluble, the desired effects will be more quickly and certainly brought about. We are told that, "These medicines travel along the superior part of the digestive tube without producing any result, and only begin to act when they arrive below the pylorus. There they find alkaline matters, elements necessary to the solution which developes purgative action and promotes their absorption." (*Mialhe.*)

Will this throw any light upon the operation of aloes when given as a purgative in the *form of ball*

to ruminants? Have the secretions of the first and second stomachs, which are alkaline, any thing to do with this development of action?

The aloetic or purgative mass of the College is made as follows:—

Cathartic Mass.

Take of Aloes, broken into small pieces,		8 parts,
	Olive Oil	1 part,
	Treacle	3 parts.

The aloes and oil are to be melted together in a water-bath, and, when removed from the fire, the treacle is to be added, and the whole well-stirred together. The addition of the treacle last of all may not, to many persons, appear a matter of much moment; but I have found that on this depends the fit consistence of the compound; for if long boiled—which is at all times objectionable in the formation of aloetic compounds, or the treacle added while the compound is over the fire—the mass will be rendered hard and brittle. But made as here directed, it will be found soft and pliable, subject, however, of course, to variations according to the temperature of the place in which it is kept; on which account, and, indeed, for many other reasons, the pharmacy of every practitioner should be, as nearly as possible, of an uniform and medium temperature.

When either the Cape or the Mocha extract is used,

I find that the formation of the compound is expedited, and its consistence improved, by withholding half a part of the oil and substituting for it water. In the winter the Barbadoes extract may require this alteration.

This formula affords an easy method of giving any desired quantity of the drug, there being half as much of other ingredients added as there is aloes in the compound. The dose of the mass, as purgative, varies from ʒvj to ʒxij. Its activity may be increased by the addition of a few drops of croton oil. Indeed, I am of opinion that the combination of purgatives for the horse has been too much lost sight of; thus six drachms of Cape aloes and ten drops of croton oil have proved equal in action to eight drachms of Barbadoes aloes. In like manner the desired operation on the bowels will be promoted by combining from half a drachm to a drachm of calomel, or the potassio-tartrate of antimony, lessening the quantity of aloes that would otherwise be given.

Much has lately been said of the advantages derivable from the combination of gentian with aloes as a purge. Experiments have been instituted at the College with this compound, but the results do not warrant the high commendation it has received. The fact is that, gentian possessing slight relaxant properties, does no more than any other agent of the same kind will do. Even common resin has been found

to increase the activity of this drug; and Christison states that "certain substances have the property of augmenting the effects of aloes as a laxative, though not themselves cathartic. The simple vegetable bitters are said thus to act, but it is undoubtedly possessed by the sulphate of iron: one grain of aloes when combined with two or three of sulphate of iron, producing as much effect on the bowels as if two or three grains of aloes were given alone." Now, if we substitute drachms for grains, we shall find that the same will obtain in reference to the horse.

That aloes in small doses proves a valuable tonic in cases of dyspepsia is well known, and, probably, this arises from its bitterness; the conjunction of gentian may therefore, in some cases, be found desirable.

The nauseating effects of aloes are referable either to sympathy, or to the extract meeting with an alkaline fluid in the stomach in place of the normal acid one.

The remark that has been made respecting the combination of purgatives will apply to all medicinal substances, arising from this circumstance, that scarcely any two agents, even of the same class, produce their specific action in precisely the same way.

The combination of therapeutics, as a general principle, is too much disregarded by us; and thus we sacrifice utility at the shrine of simplicity. Some practitioners object to the blending together of tonic

agents, because they are all found under one head or subdivision; whereas oftentimes this is most judicious: and in like manner they go through the whole list of medicinal substances. While on the one hand, we should carefully avoid an unnecessary multiplicity of remedies, as in the hands of the unscientific and unchemical prescriber they will be productive of mischief rather than of benefit, from their mutually decomposing each other and producing compounds that cause unanticipated effects; yet, on the other hand, we should avail ourselves of all the aids which an acquaintance with the various divisions of science applicable to medicine affords us, so that we may be enabled successfully to combat the many-headed hydra, disease.

Materia medica and chemistry are intimately, nay inseparably, connected; and without them the treatment of diseases becomes a mere peradventure—an empirical system worthy only of the charlatan.

Aloes should also be kept in a state of solution in the pharmacy, and for this the following formula may be adopted:

SOLUTIO ALOËS, *Solution of Aloes.*

Take of Spiked Aloes, in small pieces, 1 part,
Distilled Water . . . . . . 7 parts,
Proof Spirit . . . . 1 part.

Dissolve the aloes in the water by means of the water-

bath, and when removed add the spirit. The compound will be nearly permanent, a small portion of resinous matter only being deposited by keeping, which is of no moment. The dose, as a purgative, will vary from f℥iv to f℥viij.

It is likewise desirable to keep the extract in powder, for extemporaneous combination; but it is well known to be acted upon both by heat and moisture, and then running together, it sometimes forms a mass as solid as before pulverized. This may be prevented by mixing with the recently-powdered extract one fourth of its weight of highly-dried flour or meal. Of course, it will be easy to allow for this addition when dispensing the agent.

It may, perhaps, be observed that, in all these formulæ, all correctives, whether in the shape of essential oils or otherwise, have been abstained from. This has arisen from their having been considered unnecessary; nevertheless, the veterinary surgeon may find it desirable occasionally to add them, both to this and other compounds; which he will do, exercising his own judgment.

It has been correctly said that a carminative, by its stimulating influence on the mucous membrane of the intestines, not only prevents griping, but secures and quickens the operation of the purgative. As adjuncts, mashes should always be given; and, if possible, the animal should not be allowed to eat

any thing else for twenty-four hours previous to the exhibition of a purgative agent.

Mashes render the bowels more susceptible of the impression of a cathartic, and a less quantity also will excite them into increased action. Indeed, they are laxatives of themselves, their operation depending upon the silicious matter contained in the bran of which they are made, and this mechanically irritates the mucous surface of the intestines.

Aloes, besides being employed as a cathartic, is likewise administered as a nauseant and alterative. As the first, it is exhibited in doses of a drachm, repeated every six or eight hours, until the bowels are acted on; and in the same or increased quantities it may be given daily, combined with soap, in order to accomplish the second indication. The College formulæ for aloetic alteratives are,

Alterative Mass, No. 1.

Take of Spiked Aloes, in powder, 4 ounces,
Soft Soap . . . . . 4 ounces,
Common Mass . . . 2 pounds.

Beat intimately together, so as to form a mass. Dose, one ounce.

Alterative Mass, No. 2.

Take of Spiked Aloes, in powder, 8 ounces,
Soft Soap . . . . . 8 ounces,
Common Mass . . 16 ounces.

Beat intimately together, so as to form a mass. Dose, one ounce.

It will be seen that each ounce of No. 1 contains one drachm of aloes and one of soap, and in No. 2 these quantities are doubled.

In this compound, probably, the bitter of the aloes tends to restore the tonicity of the system, while, at the same time, the bowels and kidneys are gently, although not markedly, acted upon.

As a traumatic, aloes has also been found serviceable. At times it is sprinkled over the wound in a state of powder; but more commonly it is formed into a tincture in combination with myrrh, the antiseptic properties of which increase the value of the solution.

TINCTURA ALOËS COMPOSITA, *Compound Tincture of Aloes.*

Take of Spiked Aloes, in coarse powder,		1 pound,
Myrrh . . .	ditto . . .	½ pound,
Pyroxylic, or Rectified Spirit		1 gallon,
Water		½ gallon.

Digest for fourteen days, frequently shaking the mixture, and filter for use.

For CATTLE and SHEEP, aloes, as a purgative, was considered by Mr. Youatt to be both uncertain and unsafe in its operation, and should therefore never be

had recourse to, particularly in the first instance. I am, however, acquainted with several eminent practitioners who rely on this agent, giving it, too, in the form of ball, although that of draught is generally to be preferred. The dose for the ox would be from ʒviij to ʒxij; for the sheep, from ʒij to ʒiij.

For the Dog, Mr. Blaine considers it to be the safest general purgative we have. And such, he says, are the peculiarities of the bowels of this animal, that, while a man can take with impunity as much calomel as would kill two large dogs, a moderate-sized dog will take a quantity of aloes sufficient to destroy two stout men. The smallest dog can take fifteen or twenty grains: half a drachm is seldom too much; but the smaller dose had better be tried first, for hundreds of dogs are every year destroyed by temerity in this particular. Medium-sized dogs usually require a drachm; and some large dogs have taken two and even three drachms.

Jalap is not a bad purge for the dog, but at times it is uncertain in its action. Calomel may be given as an adjunct, but only in very small doses. Mr. Youatt asserts, that the dose of this agent for the largest dog should never exceed three grains. When it is given in large doses, it has been found to cause a determination of blood to the arteries and capillaries of the gastro-intestinal mucous membrane, followed by a sanguineous effusion; sometimes this

is dark coloured and grumous; at other times a sero-albuminous secretion is poured out, resembling acute dysentery. The secretion of the bile is much increased by it, and this fluid occasionally finds its way into the stomach.

It is evident, therefore, that calomel to him acts as a powerful irritant to the mucous membrane of the alimentary canal, in large doses, and therefore should only be given in small ones.

Mr. Youatt prefers the following mixture as a purgative for the dog:

Castor Oil Mixture.

Castor Oil	. . . . .	3 parts,
Syrup of Buckthorn	.	2 parts,
,, Poppies	. .	1 part.

Mix together: dose from one to two table-spoonfuls.

For tegumental and muscular wounds in all our domesticated animals, perhaps no better form, as a traumatic, can be adopted than that advocated for the horse under the name of the Compound Tincture of Aloes. Some recommend the addition of other gum resins, as benzoin, &c.; but I am not aware that these possess any properties imperatively to call for their introduction. In the compound adverted to we obtain the stimulating influence of the spirit, which action is kept up after this has evaporated by the substances in solution, while a resinous coating

is given by them to the lesion, thus defending it from the influence of the atmosphere.

Alumen, *vel* Potassæ Alumino-Sulphas,

Alum, or, Alumino-Sulphate of Potassa.

This triple salt consists of alumina, potassa, and sulphuric acid. It is occasionally found native in the neighbourhood of volcanoes; but by far the greater quantity is obtained by the decomposition of aluminous schistus or slate, which also contains a large portion of bituminous matter and some sulphuret of iron.

The slate is roasted, so as to dissipate the bitumen, when at the same time the sulphur is partly converted into sulphuric acid by the oxygen of the air, and the iron oxidized. The process is perfected by subsequent exposure to air and moisture, when the sulphuric acid combines with the alumina, and a sulphate of alumina is formed which effloresces on the surface. This is separated by lixiviation, and when the solution has been evaporated down to the specific gravity of 1·35, potassa is added to it, or some of its salts, and the whole is run into coolers and allowed to crystallize. The alum thus formed undergoes another solution and re-crystallization in casks which are made so as to take to pieces, when the salt is found

exteriorly in a solid cake, but interiorly its crystals are better defined.

The largest alum works in this country are at Whitby, in Yorkshire, and at Hurlett, near Paisley, in Scotland. On the average, one hundred and fifty tons of the slate afford one ton of alum; but the slower the combustion, the richer will the product be in sulphate of alumina. A continual, slow and smothered fire is, therefore, best for the ustulation of the alum slate, otherwise the sulphuret of iron may run with the earthy matters into a species of slag, or the sulphur may be dissipated in the form of fumes.

Properties and Uses.—Alum occurs in octohedral colourless crystals. It slightly effloresces on exposure to the air, has a rough and acidulous taste, is soluble in sixteen parts of water at 60°, and in about double its weight of boiling water. It has a specific gravity of 1·7. Exposed to heat it swells up, and loses its water of crystallization, and is then termed "burnt, or calcined alum," which is employed as an erodent. Care should be taken in preparing this that the sulphuric acid be not disengaged, for it will then become nearly inert; which may be known by its not reddening syrup of violets. In the shops there is a variety of alum called Roche or Rock alum, in pieces the size of an almond, and covered with a pink powder. This should come from

Roccha in Syria, but the greater part of it is now made by colouring common alum with rose-pink. It possesses no properties to recommend it abovc the alum of commerce.

Alum is a powerful astringent, whether administered internally or applied externally. It may be given to the horse in doses of from ʒij to ʒiv, and its employment has been attended with some benefit in obstinate cases of diabetes, also in diarrhœa, the primæ viæ having been previously emptied by means of laxatives. It has likewise been found useful in dysentery and lead colic. For either of these diseases it may be advantageously conjoined with opium and aromatics.

In America it is administered in large doses for bots: it is said to cause them to quit their hold, and they are then expelled by oleaginous purgatives. But it is still a question, whether it is necessary or advisable to hasten the removal of these parasites from the habitation which nature has assigned to them.

Composition.—According to Dr. Thompson, alum contains—

3	atoms	sulphate of alumina,	$58 \times 3 = 174$
1	,,	sulphate of potassa . .	$= 88$
25	,,	water	$9 \times 25 = 225$
		Equivalent .	487

Tests.—It is colourless, and entirely soluble in water, proving the absence of earthy impurities. If ammonia or potassa be added to the solution, alumina is thrown down free from colour, which again dissolves when the potassa is in excess.

Incompatibles.—Astringent vegetables, the alkalies, the alkaline earths and their carbonates, acetate of lead, and those alkaline salts whose bases by uniting with sulphuric acid precipitate the alumina.

Alum is employed most commonly as a local applicant. The compounds directed to be kept in the pharmacy of the College are as follow:

SOLUTIO ALUMINIS, *Solution of Alum.*

Take of Alum	. . . .	1 part;
Water	. . . .	16 parts.

Dissolve.

UNGUENTUM ALUMINIS COMPOSITUS, *Compound Ointment of Alum.*

Take of Alum finely powdered		
Tupentine, of each	. .	1 part;
Hogs' Lard	. . . .	3 parts.

Melt the lard and turpentine together in a water bath, and when nearly cold add the alum.

The union of an astringent with a digestive may

appear somewhat incongruous, but, from a very long use of the compound, it has been retained. In inflammation and suppuration of the skin of the heels, vulgarly denominated grease, its employment is advocated; and when judgment is exercised in its application, little more is necessary.

Alum has also been resorted to for open joints and wounded thecæ, for which purpose it is made into a cataplasm with flour or meal. Its acid coagulates the albumen of the escaping synovia, and thus closes the opening; the coagulum, therefore, should not be removed, as is too often done, but allowed to remain, in order that granulations may perfect the healing process.

The following compound has been used with success in such cases, which I have designated—

PULVIS ALUMINIS COMPOSITUS, *Compound Powder of Alum.*

Take of Alum, deprived of its water of crystallization;
Sulphate of Iron, ditto;
Myrrh, of each in powder, equal parts.
Mix them.

This may be sprinkled over the wound until it is well covered with it, adding from time to time fresh portions should any synovia escape, and over the

whole placing a pledget of tow saturated with the tincture of myrrh; or it may be made into a paste with the compound tincture of aloes, and confined by suitable means over the exposed joint.

In aphtha, a weak solution of alum may be employed with advantage, and it likewise may be used as a collyrium in chronic ophthalmia.

Alum very finely pulverized, and mixed with an equal quantity or twice its weight of flour, is a valuable styptic.

For CATTLE and SHEEP alum has been found a useful astringent, both topically applied, and given in cases of diarrhœa. Calves and lambs are especially the subjects of the last-named disease, in which alum may be exhibited in the form of whey; two drachms being dissolved in a pint of hot milk, to which a drachm of ginger may be added, and a scruple of opium.

Mr. Youatt recommends the following in preference, under the name of

Sheep and Calves' Cordial.

Take of	Prepared Chalk . . .	2 ounces;
	Powdered Catechu . .	1 ounce;
	,, Ginger . . .	4 drachms;
	,, Opium . . .	1 drachm;
	Peppermint Water . .	1 pint.

Mix them together.

The dose for lambs is from one to two table-spoonfuls morning and night. For calves the quantity may be doubled.

By some practitioners alum is given in doses of from ℥ij to ℥iv, to cause "drying" of the milk in cows; others excite into increased action the neighbouring viscera, as the bowels and kidneys; and some detract blood. Iodine has also been applied externally for this purpose.

To the Dog it is occasionally administered in doses of from ten to fifteen grains in obstinate diarrhœa, combining it with other agents of the same class; and should the case prove obstinate, alum whey may be thrown up in the form of clyster.

Ammonia, *Ammonia*. *Hypothetical*, Hydruret of Amidogen.

This compound has been designated the volatile alkali, in contradistinction to the fixed alkalies, soda, potassa, and lithia. It is abundantly given off during the decomposition of animal substances, and also from some vegetables; but it is mostly obtained from the first-named. It exists, free or combined, in both kingdoms of nature; and may readily be procured, experimentally, by the action of two parts of dry quick lime upon one part of the hydrochlorate of ammonia, applying heat to the mixture, and collecting the gas as it escapes over mercury.

The salts of ammonia having presented to chemists some peculiarities and discrepancies, a new view of the nature of ammonia has been lately adopted, by which these are obviated. It consists in considering ammonia as the hydruret of an hypothetical base to which the name of *amidogen* or *ammogen* has been given. The following exemplification of the ammonian theory will assist the student:

Amidogen . .	1 atom Nitrogen . .	=	14
	2 atoms Hydrogen .	=	2
	Equivalent		16
Ammonia . .	1 atom Nitrogen .	=	14
	3 atoms Hydrogen .	=	3
	Equivalent		17
Ammonium .	1 atom Nitrogen . .	=	14
	4 atoms Hydrogen .	=	4
	Equivalent		18

Ammonia is thus shown to be the *hydruret of amidogen,* while ammonium is the *bihydruret.* And in the oxy-acid ammoniacal salts it is assumed that an atom of water is always present, the oxygen and hydrogen of which go to convert the ammonia into an oxide of ammonium, so that they are all really compounds of the oxide of ammonium.

Properties and Uses.—Ammonia, at the ordinary temperature of the air, is gaseous, but exposed to a pressure of six and a half atmospheres, at a temperature of 50°, it becomes a liquid. It has a specific gravity of 0·59, is transparent and colourless, easily detected by its pungent odour, or by bringing a rod dipped in hydrochloric acid near it. It neither supports respiration nor combustion, and is but slightly inflammable: it possesses the leading characters of an alkali; is rapidly absorbed by water, and by union with acids forms several salts. In a nascent state it is occasionally used as a local stimulant; but more commonly it is the case that some of its compounds are directed to be employed medicinally, such as the hydrochlorate of ammonia, the sesquicarbonate of ammonia, and the solutions and acetate of ammonia.

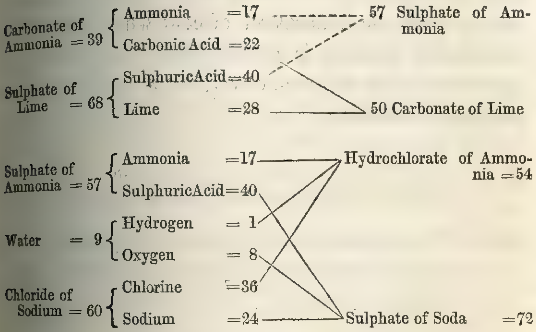
AMMONIÆ HYDROCHLORAS, *Hydrochlorate of Ammonia. Hypothetical,* Chloride of Ammonium. Old names: Muriate of Ammonia, Sal Ammoniac.

The name by which this salt is familiarly known in the arts, *sal ammoniac,* was derived from its being found native near the temple of Jupiter Ammon. It is still procurable in the neighbourhood of volcanoes in a state of efflorescence, or in groups of small

needle-like crystals. The market at one time was wholly supplied with it from Egypt, where the soot of camels' dung was made to yield it by sublimation; but now it is obtained, in this country, by the distillation of animal matters. For this purpose, bones and other animal remains, being cut into pieces and boiled, in order to extract the fat, are placed in an iron cylindrical still to which is attached a receiver. Heat being applied, there passes over an impure solution of the carbonate of ammonia, mixed with an empyreumatic oil. The oil being removed, sulphate of lime is added to the alkaline solution, when the sulphuric acid leaves the lime and combines with the ammonia, forming a soluble *sulphate of ammonia*, while the carbonic acid of the carbonate of ammonia unites with the lime, and forms an insoluble *carbonate of lime*, which is precipitated. To the sulphate of ammonia in solution is added common salt (chloride of sodium), which becomes an hydrochlorate of soda, by the oxygen of the water going to the sodium and the hydrogen to the chlorine. A double decomposition now takes place; the sulphuric acid unites with the soda, and the hydrochloric acid with the ammonia, and two new salts are formed, both of which are in solution: these are to be separated by careful evaporation. The sulphate of soda crystallizes first, and, being removed, the heat is still continued until crystals of hydrochlorate of ammonia begin to form:

as soon as this occurs, the heat is withdrawn, and the crystallized mass is afterwards sublimed.

Another method by which this compound is prepared on a large scale, and the one now usually had recourse to, is that of adding hydrochloric acid to the impure solution of carbonate of ammonia which is obtained during the preparation of coal gas, the salt being purified by repeated sublimations. Or, by the reaction of sulphuric acid and chloride of sodium on this ammoniacal solution.



Composition.—Independent of the water of crystallization, hydrochlorate of ammonia consists of

1 atom	hydrochloric acid	= 37
1 ,,	ammonia . .	= 17
	Equivalent .	54

Properties and Uses.—Hydrochlorate of ammonia occurs in concavo-convex cakes of from two to more inches in thickness. It is colourless, inodorous, striated, unacted upon by the air when pure, and has a salt, bitterish, and cool taste. Sometimes it is tinged by iron. It possesses some ductility, and, therefore, is not easily pulverised. Its specific gravity is 1·450. It is soluble in about three parts of water at 60°, and in its own weight of boiling water: at 300° it sublimes without decomposition. It is used as a topical remedy to lessen inflammatory action, since the generation of cold while the salt is undergoing solution is great. This is increased by the addition of an equal weight of the nitrate of potassa, as follows:

LOTIO REFRIGERANS, *Cooling Lotion.*

Take of Hydrochlorate of Ammonia, in powder,
Nitrate of Potassa, in powder, of each 1 part,
Water . . . . 16 parts.

The solution is to be employed as soon as made, otherwise it acts as a stimulant. Cloths are dipped into it and laid wet on the inflamed part, renewing them as soon as they become warm. A more effectual plan would be to immerse an evaporating lotion, consisting of 4 parts of rectified spirit and 16 parts

of water, in a mixture of this kind, when its temperature will be considerably lowered, and on its application the benefit derivable from the direct contact with cold, as well as that which results from evapotion, will be obtained.

Lotio Discutiens, *Discutient Lotion.*

Take of	Hydrochlorate of Ammonia .	1 part,
	Diluted Acetic Acid	8 parts,
	Camphorated Spirit	1 part.

Mix together, so as to form a lotion, from which the camphor precipitated may be separated or not, as the practitioner may think fit. This is not required to be used as soon as formed, and should be applied with friction. When the quantity of the hydrochlorate has been much increased, some blemish has ensued.

This compound is employed for the purpose of dispersing indolent tumours, and as a stimulant in chronic sprains, both for the horse and cattle, the sheeep, and the dog.

The hydrochlorate of ammonia, in a state of fine powder, mixed with an equal quantity of that of savine leaves, has occasionally been used for the removal of warts in the dog, particularly when their situation and character were such as not to admit of their eradication by other means.

Tests.—It is a nearly translucent salt, sublimed by heat, and entirely dissolved by water. Any residuum would be an impurity. It slightly reddens litmus paper; affords no precipitate with the chloride of barium, proving the absence of sulphuric acid; and yields ammonia on the addition of potassa and lime.

Incompatibles.—In veterinary practice, I am not aware of the hydrochlorate of ammonia having been given internally to any extent. Occasionally it has been exhibited, but the carbonate is generally preferred, although its properties rather associate it with the acetate of ammonia. It is, however, decomposed by the fixed alkalies and the alkaline earths.

LIQUOR AMMONIÆ, *Solution of Ammonia.* Old Names: Water of Ammonia, Spirit of Sal Ammoniac, Hartshorn.

For this the College of Physicians gives the following formula:

Take of Hydrochlorate of Ammonia, 10 ounces;
Newly-burnt Lime . . . 8 ounces;
Water . . . . 2 pints.

Put the lime, slaked with a little water, into a retort; then add the hydrochlorate of ammonia and the re-

mainder of the water, and distil fifteen fluid ounces of solution of ammonia into a receiver.

Decomposition.—The simplest explanation is, that the lime attracts the hydrochloric acid from its superior affinity, setting the ammonia free, which rising with the water in distillation, both are condensed in the receiver, forming water or solution of ammonia. The more complex but correct decomposition is represented in the following diagram:

Materials.	*Constituents.*			*Products.*	
Hydrochlorate of Ammonia =54	Ammonia . . .		17	Ammonia .	17
	Hydrochloric Acid	Hydrogen	1	Water .	9
		Chlorine	36		
Lime =28	Oxygen . . .		8		
	Calcium . . .		20	Chloride of Calcium	56

Composition.—This will depend upon its specific gravity, and the latter upon the quantity of ammoniacal gas absorbed. Mr. Phillips says, that, if prepared according to the form above given, its specific gravity is ·960, and it will consist of

10 parts ammoniacal gas,
90 parts water.

100

Properties and Uses.—Solution of ammonia is a transparent and colourless fluid, having a strong pungent odour, and an acrid taste. It is stimulant, antacid, and rubefacient: as the latter, it is most

commonly employed in combination with oil, forming a saponaceous compound, *the liniment of ammonia.*

Solution of ammonia has been given internally in the first stages of tympanitis in the horse, and hoven in cattle, when the vegetable matter is in that state of decomposition in which carbonic acid gas is disengaged: in the latter stages, the compounds of chlorine will be found of the greatest use. It acts by neutralizing the carbonic acid, thus forming a solid compound, and also by stimulating the stomach to contract upon its contents. The dose for the horse may be from f℥ss to f℥j; that for cattle may be f℥ij; but it should be largely diluted with water, or it will inflame and excoriate the mouth.

Tests.—When pure, and subjected to the influence of heat, it entirely evaporates. Ammoniacal gas is first disengaged, which may be known by its odour; and it is also rendered evident by a glass rod dipped in hydrochloric acid, or by turmeric paper: the water next follows. No precipitate is afforded by lime-water, proving the absence of carbonic acid; and when saturated with nitric acid, neither the sesquicarbonate of ammonia nor nitrate of silver throws down any thing, by which is shown the absence of all earthy matters and hydrochloric acid. With cupreous salts it forms a blue compound—*the ammoniuret of copper*,—and it has an alkaline reaction.

Incompatibles.—Acids, acidulous and most earthy and metallic salts, except those of lime, barytes, and strontia, which it does not decompose, and those of magnesia only partially.

LINIMENTUM AMMONIÆ, *Liniment of Ammonia.*

Take of Water of Ammonia	. .	1 part,
Olive Oil	. . . . .	2 parts.

Mix together, so as to form a liniment.

This may be used with advantage in sore throats, chronic tumours, sprains, and deep-seated inflammations. Its activity may be readily increased by the addition of one part of the oil of turpentine, or of cantharides, to four parts of the liniment.

AMMONIÆ SESQUI-CARBONAS, *Sesqui-carbonate of Ammonia.* Old names: Subcarbonate of Ammonia, Carbonate of Ammonia, Volatile Salt.

Take of Hydrochlorate of Ammonia	. .	1 pound,
Dried Prepared Chalk	. . .	$1\frac{1}{2}$ pound.

Pulverise them separately; then mix, and sublime with a gradually increased heat, until the retort becomes red hot.

Decomposition.—A double decomposition of the materials takes place by the agency of heat. The calcium of the chalk goes to the chlorine of the

hydrochloric acid, while the carbonic acid is attracted by the ammonia, and the water is the result of the union of the hydrogen and the oxygen. The following diagram will assist the memory:

Materials.	*Constituents.*			*Products.*
Hydrochlorate of Ammonia =54	Ammonia . . .		17	Carb. of Am. 39
	Hydrochloric Acid .	Hydrogen	1	Water . 9
		Chlorine	36	
Carbonate of Lime =50	Carbonic Acid . . .		22	
	Lime .	Oxygen	8	
		Calcium	20	Chloride of Calcium . 56

Composition.—In the diagram above given it is supposed that the two neutral compounds mutually decompose each other, and the result should be two new neutral compounds; but it appears that, during sublimation, three equivalents of each undergo decomposition, when one equivalent of ammonia and one of the water formed are dissipated; while, the carbonic acid being undiminished, the resulting compound consists of three equivalents carbonic acid, two of ammonia, and two of water; or,

$1\frac{1}{2}$ atom	carbonic acid . .	=	33
1 ,,	ammonia	=	17
1 ,,	water	=	9
	Equivalent . .		59

Properties and Uses.—Sesqui-carbonate of ammonia has a pungent odour, and an acrid, cool taste. It occurs in striated, semi-opaque, colourless masses, which effloresce on exposure to the air, and become changed into the *hydrated bicarbonate of ammonia*. It is soluble in four parts of water at 60°, and its own weight of warm water. Hot water decomposes it with effervescence. It is employed in veterinary practice principally as a diffusible stimulant: it is also an antacid. Its primary action is on the nerves of the stomach, which it excites, and this excitation is propagated over the whole system. Occasionally it is given in doses of from ʒij to ʒiv, in the form of ball, in attacks of pneumonia that have been allowed to go on until congestion has taken place, and when all the other symptoms present, except the pulse, warrant the use of the lancet; but should a vein be opened, the blood would be seen only very slowly to trickle from the orifice. By its stimulating influence, the action of the heart is roused, and blood may then be withdrawn, thus relieving the congestion of the vessels.

Incompatibles.—Acids, and acidulous salts; the acetate and diacetate of lead, and the sulphates of iron, copper, and zinc. It is also decomposed by the fixed alkalies and their carbonates, and by lime-water.

Tests.—Translucent, and entirely soluble in water. Nitric acid being added to it to saturation, no preci-

pitate is thrown down either by the chloride of barium or the nitrate of silver.

Liquor Ammoniæ Acetatis, *Solution of Acetate of Ammonia.* Old names: Water of Acetate of Ammonia. Mindererus's Spirit.

Take of Sesqui-carbonate of Ammonia, $4\frac{1}{2}$ ounces, or as much as is sufficient;
Diluted Acetic Acid . . . . 4 pints.

Add the salt to the acid till saturated, or a neutral solution, is the result.

Decomposition.—The acetic acid, from its superior affinity, attracts the ammonia, while the carbonic acid is liberated in a gaseous state.

Composition.—A solution of acetate of ammonia in water. The neutral salt probably consists of

1 atom Ammonia	. . . . .	= 17
1 „ Acetic Acid	. . . .	= 51
		68

Properties and Uses.—A colourless solution, inodorous, and slightly nauseous to the taste. Internally administered, it is a febrifuge and diaphoretic. It may be advantageously given with the nitrate of potassa in febrile affections, and will form a proper vehicle for the extract of the deadly nightshade in

pulmonic and other diseases. Dose from f℥iv to f℥viij.

Although the question, Whether diaphoresis can be excited in the horse? has not been definitely answered, I feel it my duty to state my belief that it can, when assisted by heat: I mean the heat given off from the body, confined by clothing; otherwise the influence of the agents which we employ for the purpose will be determined to the kidneys, which emunctories in the horse are acted upon with ease and certainty. In some experiments, in which a pint of this solution was repeatedly administered, I find it is recorded by me that the exhalents of the skin were increased in action by it, and the pulse lowered from 40 to 36 beats in the minute.

It is employed externally as a discutient, for which the following formula is given by Mr. Percivall:

Take of Solution of Acetate of Ammonia,	
Rectified Spirit, of each .	4 ounces,
Water	1 pint.

Mix together, so as to form a lotion, with which the inflamed part is to be kept constantly wetted.

Tests.—The absence of lead and copper is shown by adding hydrosulphuric acid to the solution; and of hydrochloric and sulphuric acids, by the nitrate of silver and the chloride of barium: the solution

being evaporated to dryness, that which remains evolves ammonia, and is dissipated by heat.

Incompatibles.—Acids, the fixed alkalies and their carbonates, lime and lime-water, and, as some carbonic acid is usually present, the acetate and the diacetate of lead.

SPIRITUS AMMONIÆ, *Spirit of Ammonia, Solution of Ammonia in rectified Spirit.*

Take of	Rectified Spirit . . .	2 pints,
	Fresh burnt Lime . . .	12 ounces,
	Hydrochlorate of Ammonia	8 ,,
	Water	$6\frac{1}{2}$ fluid ounces.

Slake the lime with the water in a covered earthen vessel, and, when cold, mix it intimately in a mortar with the hydrochlorate of ammonia in a state of powder; then quickly transfer the mixture to a glass retort, which adapt to a tube that passes nearly to the bottom of a bottle containing the rectified spirit. Distil as long as any thing passes over, keeping the receiver cool.

Decomposition.—The changes that occur in this preparation are analogous to those that take place in the formation of the water of ammonia, the compound being a solution of ammoniacal gas in rectified spirit.

Properties and Uses.—The spirit of ammonia pos-

sesses the stimulant and antacid properties of the water of ammonia, and dissolves the volatile oils and resins. Its best form as an antispasmodic is the aromatic spirit, made as follows:

SPIRITUS AMMONIÆ AROMATICUS, *Aromatic Spirit of Ammonia.* Old names: Spirit of Sal Volatile, Compound Spirit of Ammonia.

Take of	Spirit of Ammonia . .	8 fluid ounces,
	Volatile Oil of Lemons .	1 fluid drachm,
	Volatile Oil of Rosemary	$1\frac{1}{2}$ fluid drachm.

Dissolve the oils in the spirit by agitation.

Properties and Uses.—I have chosen the above formula of the Edinburgh Pharmacopœia, because elsewhere the use of an ammoniated tincture of opium has been advocated by me, and the carbonated spirit of ammonia of the London College of Physicians does not dissolve morphia like this, the caustic spirit.

Aromatic spirit of ammonia is a transparent colourless fluid, which becomes brown by keeping; it has a specific gravity of 0·914, a pungent aromatic smell, and an acrid taste. It is, perhaps, the most valuable of the compounds of ammonia for internal use as an antispasmodic and stimulant. My colleague, Professor Simonds, at my suggestion, years since extensively employed it, with marked benefit, during the

first stages of hoven in cattle, giving it in doses of from two to four ounces, largely diluted with water. In tympanitis, or flatulent colic in the horse, it has proved equally efficacious; the quantity given to that animal being from half an ounce to an ounce.

It would appear that, while it neutralizes any acids that may have been generated by the fermenting vegetable mass, it likewise prevents the remainder from becoming acescent, and also acts as a stimulant to the stomach, rousing it to healthy action.

Incompatibles.—Acids, acidulous salts, earthy and metallic salts, and lime-water.

ANCHUSA RADIX, *Alkanet Root.*

The plant affording this root is a perennial, and a native of the South of Europe. The market is supplied with it from France. The smaller roots should be chosen, as they are invested with the most bark, in which the colouring matter resides.

Properties and Uses.—The dried root is inodorous and insipid. It is wrinkled, and covered with a dusky red bark, which imparts its colour very readily to oils, fat, wax, &c., and on this account alone it is employed.

ANTHEMIDIS FLORES, *Chamomile Flowers.*

The chamomile plant is indigenous to Great

Britain, a perennial, and growing in abundance upon dry waste lands. The market, however, is principally supplied with the flowers by the growers of medicinal herbs at Mitcham, in Surrey. As is the case generally, the plant loses much of its activity by cultivation; and, what is still more unfortunate, those flowers are preferred which possess the least virtue, the double kind being commonly sold in the shops; whereas the single ones are the best, from the medicinal qualities residing in the disc florets.

Composition.—Bitter extractive, resin, essential oil, tannic, and gallic acid.

Properties and Uses.—Chamomile flowers have a powerful grateful odour, and a nauseous bitter taste. These properties are abstracted by water and alcohol. They should not be kept more than twelve months, unless great care is taken that they are preserved perfectly dry. Their action is that of a mild tonic and carminative. They constitute, perhaps, one of the mildest vegetable tonics; and may be given in doses of from ʒij to ʒiv, in combination with ginger, or some other aromatic, once or twice a day. They will be found serviceable where much debility remains after inflammatory attacks, also in cases of indigestion. With the salts of iron, however, they are incompatible, as they contain tannic acid.

ANTIMONIUM, *Antimony*. Old name: Stibium.

The metal antimony, serves as the basis of several therapeutic compounds. It is commonly procured from the grey sulphuret by the process of reduction; and is of a white brilliant colour, with a bluish grey shade, slowly tarnishing by exposure to the air. It fuses at 810° F., and at high temperatures is volatilized. Its specific gravity is 6·712. Atomic weight 129.

ANTIMONII POTASSIO-TARTRAS, *Potassio-Tartrate of Antimony*. Old names: Tartarized Antimony. Emetic Tartar.

The following altered form is given by the College of Physicians:

Take of Ter-sulphuret of Antimony, in very fine powder	1 pound,
Sulphuric Acid	15 fl. ounces,
Bitartrate of Potassa	10 ounces,
Distilled Water	5 pints.

Mix the ter-sulphuret with the acid in an iron vessel; to these apply a slow fire beneath a chimney, frequently stirring with an iron spatula. Then increase the heat until the flame of the ignited sulphur being extinct, nothing remains but a whitish powdery mass. When this is cold, wash it with

water until no acid can be detected, and dry it. Carefully mix nine ounces of this salt with the bitartrate of potassa, and boil in the distilled water for half an hour. Filter the solution while hot, and set aside that crystals may form. The solution being poured off these, dry them, and then again evaporate the solution that more crystals may form.

Decomposition.—This form differs from that given in the last Pharmacopœia of the College of Physicians, and is considered to be an improvement. Sulphuric acid in excess is added to the ter-sulphuret of antimony, so as to oxidize it, and convert it into a sulphate of antimony. This excess, according to Phillips, is necessary, so as to allow of a partial oxidation of the sulphur, part of which escapes as sulphurous acid, and part is separated as sulphur, which ignites, and also forms sulphurous acid gas. The changes that occur further are as follow: six equivalents of sulphuric acid—viewing it as anhydrous, since the water plays no part in the decomposition—act on one of ter-sulphuret of antimony. Three equivalents of the acid undergo decomposition, yielding up three equivalents of oxygen to the antimony to convert it into a ter-oxide, and sulphurous acid gas is given off, while the sulphur of the ter-sulphuret is burnt up. The remaining three equivalents of undecomposed acid now combine with the oxide of antimony, and form it into a *ter-sulphate.*

Materials.		*Products.*	
177 Ter-sulphuret of Antimony	Sulphur .	16×3= 48	Sulphur =48
	Antimony .	=129	
240 Sulphuric Acid	3 Sulphurous Acid	32×3= 96	Sulphurous Acid =96
	3 Oxygen .	8×3= 24	
	3 Sulphuric Acid	40×3=120	Ter-sulphate Antim. =273

This *ter*-sulphate of antimony, on the addition of water, becomes converted into a small portion of soluble super-sulphate and an insoluble sub-sulphate; which latter, by continued washing, is changed into an anhydrous *di*sulphate. This being boiled with two equivalents of bitartrate of potassa in solution, two equivalents of the tartaric acid combine with the two equivalents of ter-oxide of antimony, forming two equivalents of tartrate of antimony, which uniting with the remaining two equivalents of tartrate of potassa and six of water, form two equivalents of crystallized *potassio-tartrate of antimony*, the sulphuric acid remaining in the mother-water.

346 Disulphate Antimony	1 Sulphuric Acid ..	= 40	Sulphuric Acid =40
	2 Teroxide Antimony	153×2=306	
378 Bitartrate Potassa	2 Water . .	9×2= 18	
	2 Tartrate Potassa	114×2=228	
	2 Tartaric Acid .	66×2=132	
36 Water .	4 Water . .	9×4= 36	2 Potassio Tartrate of Antimony =720

Composition.—When crystallized, potassio-tartrate of antimony consists of

1 atom Tartrate of Potassa .		=114
1 „ Tartrate of Antimony		=219
3 atoms of Water . .	9 × 3=	27
Equivalent .		360

It occurs in octohedral crystals, which slightly effloresce on eposure to the air. They have a styptic taste, and are soluble in 15 parts of water at 60°, and 3 parts at 212°. The compound should be at all times purchased in the state of crystal.

Properties and Uses.—In my earlier editions I observed that I should be much pleased if I could reconcile the conflicting statements respecting the action of this salt. Most practitioners employ it; nevertheless I have not been able to obtain from any one of them a satisfactory account of its *modus operandi.* Sir B. Brodie has ascertained that, when given to animals in large doses, it possesses sedative powers, evinced by its controlling the force of the circulation to such a degree that, in some instances, the heart almost ceased to beat and the blood to flow. It has been suggested by Mr. J. Turner, that, although it may not produce actual diaphoresis in the horse, it restores the function of the exhalents of the skin, and thus proves of service. That increased action of the vessels of the skin is induced

by this agent, is confirmed by observations made by my colleague, Professor Spooner, who noticed and directed my attention to several cases in which, when it had been given in repeated doses for some time, it caused much debility of the covering integument, indicated by the hair being easily removed in places. Mr. Hugh Ferguson also states, that "in some instances it increases the capillary action of the skin, producing a tendency to diaphoresis." This is markedly shown on exercise being given after the exhibition of a few doses of the salt. He has also seen it operate as a diuretic, and as a nauseant he does not for a moment question its potency; so that, from its very general use, we are warranted to conclude that beneficial effects do result from its employment. I have given it both in repeated small and large doses for a considerable time, and am enabled to speak somewhat confidently of its influence. I believe it to be a nauseant and a diaphoretic in its action, and causing, when long exhibited, an intermission and much feebleness of the pulse. It may be given in quantities varying from ʒss to ʒij, depending upon the plan adopted, whether it be that of exhibiting one dose in the day, or repeated small doses. The latter is always to be preferred, since, if administered in large quantities, or for too long a time, it will cause a thickening and corrugation of the mucous coat of the stomach, followed by acute inflammation and death.

It is judiciously combined with the nitrate of potassa and camphor, and the compound is usually denominated a fever ball, a form for which is as follows:

Fever Ball.

Take of Potassio-tartrate of Antimony,
Camphor, of each . half a drachm,
Nitrate of Potassa . 2 drachms.

Common mass, a sufficient quantity to form a ball for one dose, which may be repeated during the day.

Tartarized antimony is extolled as a vermifuge in a dose of from ʒj to ʒij given at night, an aloetic purge being administered the following morning. Others, with greater advantage, give it in doses of a drachm for six consecutive mornings, and always before the horse is fed; and on the seventh day a dose of physic is exhibited. Few worms, it is said, appear after this.

Externally applied, it has been recommended by Mr. W. Simpson and Mr. J. W. Gloag in chest affections. The form in which it may be used is in combination with lard, in the proportions of from ʒj to ʒij of the salt to ℥j of lard. Considerable friction having been resorted to during its application, it becomes a very powerful irritant, exciting much pustular eruption on the skin, and therefore it may prove serviceable in many deep-seated inflammations. Its operation,

however, is often painful; and I have found, when extensively applied, that it causes much disorganization of the part, deeply deranging the structures beneath, and producing an unsightly suppurating sore; nevertheless, in the hands of the scientific practitioner, it is an agent that may be advantageously employed when the use of cantharides or terebinthinate compounds is contra-indicated.

Tests.—Its solubility in water. A copious precipitate of the *red sulphuret of antimony* takes place on passing a current of sulphuretted hydrogen gas through the solution; also of the *oxide of antimony* on the addition of the alkalies and nitric acid to it; the latter being in excess re-dissolves it. No precipitate is afforded on bringing a rod of nitrate of silver in contact with it, which would take place if chlorine or any of the chlorides were present: nor does the chloride of barium give any precipitate, indicating the absence of sulphuric acid and the sulphates.

Incompatibles.—The acids, the alkalies, and their carbonates, the soaps, most of the earths and metallic oxides, acetate of lead, and many vegetable infusions, especially those which are bitter and astringent, as bark, catechu, &c. The best antidote is a decoction of yellow bark: one fluid ounce, according to Dr. Paris, rendering inert a scruple of this salt.

To Cattle, the potassio-tartrate of antimony may be given in doses of from one drachm to two drachms, combining it with the nitrate of potassa and digitalis. It has been found of service in pulmonic and other inflammatory diseases, by lowering the heart's action. The activity of blistering compounds is increased by its addition; about one part to eight being the usual proportions. The action of aloes is also said to be promoted by it; and calves are readily purged by it in quantities of from two to three drachms.

On the Dog it acts as an emetic, the dose being from one to three grains. A very large and strong dog might require four grains. Applied externally it quickly induces nausea, followed by vomiting—the stomach of the dog being easily acted upon; and hence the many agents that are extolled as emetics for him. Some are highly objectionable, from the violence with which they operate, as the turpith mineral—*subsulphas hydrargyri flavus;* crude antimony—*antimonii ter-sulphuretum*, and common salt; although these are favorites with sportsmen. Vomition appears to be almost a natural act in this animal, or, at any rate, it is generally attended with salutary effects. The agent partaken of by him in order to produce it, is the dog-grass,—*cynosurus echinatus*.

Mr. Blaine says, "Calomel also, from a grain and a half to four grains, forms a very useful and cleansing emetic, acting, as it usually does, upon both the

stomach and bowels. It may be mixed in equal proportions with the potassio-tartrate of antimony; and of the mixture from a grain and a half, as the smallest dose, to four, five, or six grains as a full one, may be given with benefit in any affection where both intentions are to be fulfilled. In pure febrile cases it may be prudent to trust to the tartarised antimony alone—an antimonial emetic being peculiarly called for in these cases, by the power it possesses of lessening the action of the heart and arteries."

ANTIMONII TER-CHLORIDUM, *Ter-chloride of Antimony.* Old Names: Oil or Butter of Antimony, Muriate of Antimony, Sesqui-chloride of Antimony. Caustic Antimony.

This compound has no longer a place in the Pharmacopœia of the College of Physicians; but, as it is still largely employed in veterinary practice, I have thought it deserving of some notice. This is the lowest combination of chlorine with the metal antimony, being a proto-chloride.

The easiest method of obtaining it is by digesting the sulphuret of antimony in hydro-chloric acid, and adding pernitrate of iron to the solution to give it colour.

An analogous compound is directed to be prepared

by the Dublin Pharmacopœia thus:—Digest, and afterwards boil for an hour, 20 parts of sesqui-sulphuret of antimony in a mixture of 100 parts of hydrochloric acid and 1 part of nitric acid. This is to be filtered when cold, or allowed to remain at rest, so that all the sulphuret unacted upon may be deposited.

If this solution be formed into water, an oxide of antimony falls, which would constitute a good substitute for antimonial or James's powder. It would seem to contain some chloride in combination.

Decomposition.—By boiling the ter-sulphuret of antimony in hydrochloric acid, the products are hydrosulphuric acid, which escapes as gas, and ter-chloride of antimony in solution. The nitric acid is employed to decompose the hydrosulphuric acid remaining in combination; this it does by its oxygen uniting with the hydrogen so as to form water, the sulphur being precipitated.

Hydrochloric Acid 3 eq. = 111	Hydrogen = 3 Chlorine = 108	51 Hydro-sulphuric Acid (3)
Ter-sulphuret of Antimony = 177	Sulphur = 48 Antimony = 129	237 Ter-chloride of Antimony.

Composition.—This compound, if pure, should be a ter-chloride, and consequently consist of—

1 atom Antimony	. . . .	= 129
3 atoms Chlorine	. . . .	= 108
Equivalent	. .	237

But the *butter of antimony* of the shops contains ter-chloride of antimony, free hydrochloric acid, water, and iron, with impurities derived from the ter-sulphuret from which it is prepared.

Properties and Uses.—As it ordinarily occurs, it is a transparent fluid, varying in colour from yellow to a deep red, this being dependent on the quantity of iron added. It emits fumes, owing to its containing an excess of hydrochloric acid. Its specific gravity is 1·2 to 1·5, and it possesses acid properties.

Therapeutically it is employed as a caustic. It has been much praised by those who use it, on account of its not creating any great degree of pain or inflammation. Its action, also, can be accurately ascertained by the change produced in the colour of the part to which it is applied, and after the separation of the eschar a clean healthy surface is generally presented. It has been recommended in cases of corns, canker, and other diseases of the foot of the horse indicating unhealthy action; also for foul in the foot in cattle and foot-rot in sheep, for which Mr. Youatt says "there is no application comparable to this. It is effectual as a superficial caustic; and it so readily combines with the fluids belonging to the

part to which it is applied, that it quickly becomes diluted, and is then incapable of producing any deep or corroding mischief. So far as these foot cases are concerned, it supersedes every other application."

Tests.—It is decomposed by water, which throws down a yellowish-white powder—*the oxychloruret of antimony.* The hydrosulphurets produce an orange-red precipitate—*the precipitated sulphuret of antimony;* the alkalies a white precipitate—*the oxide of antimony;* and nitrate of silver gives a precipitate consisting of *the chloride of silver* and *oxide of antimony.*

ANTIMONII TER-SULPHURETUM, *Ter-sulphuret of Antimony,* lately called the *Sesqui-sulphuret.*

This compound is known among horsemen by the name of *black* or *crude antimony.* It is the grey ore, the most common of all the antimonial ores, and found in France, Spain, England, Scotland, and many other places. The market is chiefly supplied from Germany and Holland. The process which it goes through is simply this:—the adventitious substance with which the mineral is mixed are separated as much as possible by the hand. The ore being then broken into fragments, is placed in a reverberatory furnace, covered with charcoal, and exposed to a low red heat. The sulphuret fuses, and the re-

maining earthy portions floating on the surface are removed by a rake, while the fluid parts are made to run into moulds. Sometimes the ore is put into a crucible perforated with holes, which is placed within another entire; and these being introduced into the furnace, the sulphuret melts and percolates through the first into the second vessel, leaving the extraneous matters behind. It then constitutes the crude antimony of commerce, which is of a crystalline structure, massive, and of a greyish steel colour, inodorous, insipid, and insoluble in water and alcohol.

Composition.—1 atom Antimony	. .	=129
3 atoms Sulphur	. .	= 48
Equivalent	. . .	177

Properties.—This compound of antimony has been extolled as an alterative. Its action depends, in a great measure, upon the state of the stomach and bowels; for if much acid exists in them, its operation will sometimes be violent. Its administration, therefore, should always be preceded by the exhibition of a laxative. It has been given in doses of from ʒij to ℥ss. But most commonly and most advantageously it is combined with sulphur and the nitrate of potash, forming a compound much in request by stable-men. It is not an objectionable compound when given with caution; and is constituted as follows:

Alterative Powder.

Take of Sublimed Sulphur . . . 2 parts,
Ter-sulphuret, of Antimony, in powder,
Nitrate of Potassa, of each . 1 part.

Mix intimately together. Dose from ʒss to ʒj, given in the animal's provender.

Tests.—The sulphuret of antimony, as it occurs in the shops, sometimes contains other substances, such as lead, arsenic, manganese, and iron. The presence of lead is indicated by the texture being foliated rather than striated; of arsenic, by the garlic odour emitted, when a portion is thrown on live coals; of manganese and iron, from its not being vaporizable. These are the ordinary tests, but, where minute investigation is necessary, others must be had recourse to.

It should never be purchased in the state of powder, but in conical masses as obtained from the hands of the purifier, since, after pulverization, it is frequently mixed with the carburet of iron and some other substances.

There is another of the compounds of antimony which, at one time, was much in request, designated, from its colour, *the liver of antimony*, also *saffron of antimony*, and *crocus metallorum*. It appears to have been obtained by roasting the ter-sulphuret,

and to consist of the protoxide of antimony and antimonious acid, with more or less of the unacted-upon sulphuret. Much of this was made artificially by colouring the last-named compound with Armenian bole. It may, however, safely give place to the ter-sulphuret of antimony, as also may the *golden sulphuret of antimony*, the *oxy-sulphuret*, and others called *kermes mineral* and *precipitated sulphuret of antimony;* these being all variable compounds and of doubtful efficacy. Their colour, however, recommends them to the notice of some persons. If a stream of sulphuretted hydrogen be passed through a solution of potassio-tartrate of antimony, a red precipitate, inclining to orange, is thrown down. This appears to be the most definite compound; and yet doubts are entertained of its true constitution. It was considered to be the *hydrosulphate of antimony;* or a compound of sulphuretted hydrogen and oxide of antimony. It is now regarded as an hydrated sulphuret of antimony.

Kermes mineral is generally prepared as follows: equal parts of sulphuret of antimony and of caustic potassa are fused together; the resulting mass is finely powdered and boiled in ten times its weight of water. The liquor is filtered while hot; and during cooling, it deposits *kermes*. The mother-liquor of kermes deposits a copious yellowish-red precipitate upon the addition of dilute sulphuric acid, which,

when washed and dried, is known under the name of *golden sulphur of antimony.*—*Brande.*

The oxy-sulphuret of antimony of the present Pharmacopœia is probably a mixture of kermes and golden sulphuret.

Pulvis Antimonii Compositus, *Compound powder of Antimony.* Old name: Pulvis Antimonialis, Antimonial Powder.

Take of—

Ter-sulphuret of antimony, powdered, a pound,
Horn shavings, two pounds.

Mix and throw them into a crucible heated to redness, and stir constantly till vapour no longer arises. Rub the residue to powder, and put it in a crucible. Apply heat, and increase it gradually that it may continue red hot for two hours. Grind the residual powder as fine as possible.

Decomposition.—By burning, the sulphur of the sulphuret of antimony is dissipated, and also the gelatine of the heavy matter, while the metal antimony combines with the oxygen of the air. The phosphate of lime being unchanged by the heat, unites with this last-named compound, "and there remains in the crucible a mixture of *antimoniate of antimony,* formerly called antimonious acid, and phosphate of lime."—*Phillips.*

Composition.—This appears to be very variable,

depending upon the difficulty of conducting the process, on the large scale, so as to obtain a uniform product. Essentially it may be said to be made up of oxide of antimony and phosphate of lime. Brande says "the antimonial powder of the Pharmacopœia is an uncertain and ill-contrived preparation. Its activity depends upon the proportion of protoxide it contains; but a great part of the protoxide may be volatilised, or converted into deutoxide, of a mixture of which, with phosphate of lime, the antimonial powder generally consists." This preparation has been substituted for James's powder, to which in composition it bears some resemblance. But while true James's powder contains phosphate of lime and antimonious acid, there are also present in it "one or two per cent. of soluble antimonite of lime, and between four and ten per cent. of sesqui-oxide of antimony. The antimonial powder of the Pharmacopœia differs from the quack powder in presenting less antimonite of lime, and likewise a variable, but always inferior proportion of sesqui-oxide, never exceeding four per cent."—*Christison.*

Properties and uses.—Antimonial powder is inodorous and insipid, of a dull white colour, insoluble in water, and only partially soluble in acids. On the horse I believe it to be inert; I have given it in very large doses, and these frequently repeated, without perceiving any effects from it. To this animal,

and perhaps to most others that come under the care of the Veterinary Surgeon, the potassio-tartrate of antimony will be found a far more certain and efficacious compound. Professor Simonds, however, finds the stomach of the dog so readily excited by the last-named compound, that as a febrifuge and diaphoretic, he prefers the *true* James's powder, giving it in doses of from 5 to 10 grains.

Argentum, *Silver*.

This valuable metal was known in the earliest ages of which we have any record. It is found in the mineral kingdom in various states, being alloyed with other metals, or combined with sulphur, oxygen, &c.; and occasionally it is met with nearly pure.

There are various processes for its extraction. At Freyburg the sulphuret of silver is converted into a chloride by the addition of common salt: water and iron being now added, the chloride is removed, and the silver is then amalgamated with mercury; and this being subjected to distillation, the mercury is volatilised, and the silver remains behind.

Some of the lead ores of this country contain much silver. To obtain it, they are first roasted, in order to dissipate the sulphur, and afterwards smelted with charcoal. Subsequently they are submitted to

cupellation, by which the lead becoming oxidized, is partly volatilized, and the other part, sinking in the cupel, leaves the silver behind.

Pure silver is white, inodorous, and tasteless; moderately hard and elastic; very malleable and ductile. When exposed to the air it does not oxidate, but is readily acted on by the sulphurous vapours existing there. Its specific gravity is 10·5; atomic weight 108.

In pharmacy it is used for the preparation of the nitrate of silver.

Argenti Nitras, *Nitrate of Silver.*

Vulgo: Lunar Caustic.

Take of Silver	. . .	1 ounce and a half,
Nitric Acid	. . .	1 fluid ounce,
Distilled Water	.	2 fluid ounces.

Mix the acid and the water together, and dissolve the silver in them by means of a sand-bath. Then gradually increase the heat, that the nitrate of silver may be dried. Melt this in a crucible with a slow fire, until, the water being expelled, ebullition ceases; and then pour it into proper moulds.

Decomposition.—A portion of the acid becomes decomposed, being resolved into nitric oxide gas, which escapes into the air and forms nitrous acid fumes, and oxygen which combines with the silver:

this oxide is dissolved by the remaining undecomposed acid, and a nitrate of silver is the result.

4 eq. Nitric Acid	Nitrogen . .		= 14	30 Nitric Oxide
	2 equiv. Oxygen	8×2=	16	
	3 equiv. Oxygen	8×3=	24	
54×4 . =216	3 equiv. Undecomposed Acid . .		=162	
3 equiv. Silver .	108×3 . .		=324	510 Nitrate of Silver 3 eq.

Composition.—1 atom Nitric Acid . . = 54
1 ,, Oxide of Silver . =116

Equivalent . . 170

Properties and Uses.—Nitrate of silver occurs in the shops in the form of small cylinders, enveloped in white or blue paper, which, on being broken, present a greyish crystalline structure. It should be entirely soluble in water and alcohol. By exposure to the air it blackens. If it deliquesces, it may be suspected to contain copper, which may be proved by its solution in ammonia. Externally it is a caustic, and both a manageable and a powerful one. Applied either to the skin or to a sore, it first forms a white film, the result of its union with the albumen, which, in a few hours, darkens in colour, and ultimately becomes a black eschar, from the reduction of the metal. This hardens, separates at the edges, and at last peels off. On mucous surfaces

its action is less energetic, arising from the intervention of the secretion. The hair is commonly dyed black by it.

Mr. Youatt strongly advocated its employment for empoisoned wounds and bites of rabid animals: in his opinion, it supersedes the use of every other caustic, and, generally, of the knife. He also recommends it internally as a tonic to the dog, in cases of chorea, the dose being from an eighth to a quarter of a grain.

A dilute solution may be employed as an excitant to wounds in which the healing process has become sluggish. For this purpose, ten grains or more may be dissolved in a fluid ounce of distilled water. A few fibres of tow, dipped in this solution, being drawn through the channel which is left on the removal of a seton, quickly excites the healing action. Occasionally one or two drops of this solution, diluted with an equal volume of water, are introduced into the eye, for the purpose of removing opalescence of the cornea: the strength of this may be gradually increased. In cases of fungoid matter being thrown out on the cornea, it may be touched with a rod of the nitrate of silver. Some pain will follow its application, but this soon passes off. Those who employ this agent as their general caustic would do well to encoat it with a thin layer of sealing-wax, as a preservative.

Some practitioners prefer the form of ointment in cases of chronic ophthalmia, on account of its being more easily diffused over the eye. This may be made by triturating together from five to ten grains of the nitrate, in a state of fine powder, and an ounce of lard : a portion, about the size of a pea, is to be introduced between the lids, and repeated every third day. This compound should not be kept long, because the fatty matter speedily decomposes the salt.

Incompatibles.—It is decomposed by both spring and river water, by the alkalies, their carbonates, the chlorides, hydrochloric, sulphuric, and hydrosulphuric acids and their salts, and astringent vegetable infusions.

Tests.—Its purity is known by its colour and entire solubility in water. Copper introduced into the solution precipitates the silver. With chloride of sodium a white powder is thrown down—*the chloride of silver,* which is soluble in excess of ammonia, and the supernatant fluid should suffer no discoloration by hydrosulphuric acid; if it does, copper or lead, or both, may be present. The salt is otherwise known by its deflagrating when heated with charcoal, and evolving nitrous fumes; also by its action on the cuticle.

ARGENTI CYANIDUM, *Cyanide of Silver.*

Take of Nitrate of Silver . . . $2\frac{1}{4}$ ounces;
Dilute Hydrocyanic Acid,
Distilled Water, of each . 1 pint.

Dissolve the nitrate of silver in the water, add to them the diluted hydrocyanic acid, and mix. Wash the precipitate that is thrown down, and dry it.

Decomposition.

1 eq. Hydrocyanic Acid { Cyanogen . = 26 — 134 Cyanide of Silver.
{ Hydrogen . = 1

1 eq. Nitrate of Silver { Silver . . =108
{ Oxygen . . = 8
{ Nitric Acid . 54 — Liquid Nitric Acid.

Composition.—1 atom Silver . . =108
1 „ Cyanogen . = 26

Equivalent . . 134

Properties and Uses.—Cyanide of silver occurs as a white powder, insoluble in water, and also in dilute sulphuric and nitric acids; but it is soluble in ammonia, and decomposed by hydrosulphuric and hydrochloric acids. It is used for obtaining hydrocyanic acid.

Æther Sulphuricus, *Sulphuric Ether.*

Take of Rectified Spirit	. . . .	3 pounds,
Sulphuric Acid	. . . .	2 pounds,
Carbonate of Potassa, previously ignited	. . .	1 ounce.

Pour two pounds of the spirit into a glass retort, add the acid to it, and mix. Afterwards place it on a sand-bath, and raise the heat so that the liquor may quickly boil, and the ether pass into a receiving vessel kept cool by ice or water. Let the liquor distil until some heavier portion begins to pass over. On that which remains in the retort, after the heat has subsided, pour the remainder of the spirit, so that the ether may distil in the same manner. Mix the distilled liquors, then pour off the supernatant portion, and add to it the carbonate of potassa, shaking them frequently during an hour. Lastly, let the ether distil from a large retort, and be kept in a stoppered vessel.

Decomposition.—By the mixture of one equivalent of alcohol with two equivalents of sulphuric acid, a peculiar compound is formed, called the *sulphovinic acid:* this being su bjected to distillation, one equivalent of ether passes over into the receiver, and there remain in the retort two equivalents of sulphuric acid, with one equivalent of water. On this account it was at one time thought that all effected

by the sulphuric acid was the abstraction of an equivalent of water from the two equivalents of alcohol; and, although this in reality is the case, it appears to be only indirectly brought about; for, on mixing sulphuric acid with alcohol, the properties of this acid and its saturating power are fundamentally changed. The theory of etherification, however, is exceedingly complicated, and chemists are not agreed respecting it. The transmutation, nevertheless, is entirely independent of any change in the sulphuric acid, as the following diagram will show:

Sulphovinic Acid	Alcohol 1 eq. = 46	4 Carbon .	$6 \times 4 = 24$	Ether = 37
		5 Hydrogen	$1 \times 5 = 5$	
		1 Hydrogen .	$= 1$	
		1 Oxygen .	$= 8$	
		1 Oxygen .	$= 8$	Water = 9
	Sulphuric Acid, 2 equiv. .		$= 80$	

Mitscherlich considers the formation of ether to be owing to catalytic action, for the sulphovinic acid is no sooner formed than it is again decomposed, and resolved into two atoms sulphuric acid, one of water, and one of ether, which last distils over: thus—

	Sulph. Acid.		Carbon.		Hydrogen.		Oxygen.		
1 atom Sulphovinic Acid	80	+	24	+	6	+	16	=	126
Remaining in retort .	80			+	1	+	8	=	89
Distilled over, 1 eq. Ether .			24	+	5	+	8	=	37

Composition.—Pure ether is thus shown to consist of

4 atoms Carbon .	$6 \times 4 = 24$	
5 „ Hydrogen	$1 \times 5 = 5$	
1 atom Oxygen	$= 8$	
Equivalent . . .	37	

Theoretically it has been regarded as an oxide of ethyle (C_4H_5), which is an hypothetical salt-basyle, or organic radicle.

Properties and Uses.—Ether is a transparent colourless fluid, having a penetrating odour and a pungent and sweetish taste. Its specific gravity should be 0·730 ; but, as met with in shops, it fluctuates between 0·733 and 0·765. It totally evaporates in the air ; indeed, its volatility is such that it cannot be poured from one vessel to another without sustaining loss by evaporation ; and the inflammability of its vapour is so great, that the approach of flame is to be carefully guarded against. It reddens litmus slightly, combines sparingly with water, but mixes in all proportions with alcohol.

It is employed by some as an antispasmodic, and it certainly is a very powerful diffusible stimulant ; but at the same time its action is transient. It may be given in doses of from f ʒiv to f ʒvj.

The rapidity and facility with which it evaporates, thus generating much cold, renders it a valuable

refrigerant; but except in extreme cases, as in the reduction of a hernial tumour, it is never resorted to.

The inhalation of the vapour of ether has been had recourse to for the lower animals as a hypnotic; and by it the smaller ones, as the sheep, pig, cat, &c., are easily rendered insensible to pain, so that surgical operations may be performed on them without the manifestation of any suffering. The horse is in like manner soon affected by it; but there are objections to its employment for this animal, which, unless they are obviated, will preclude its being generally used by the practitioners of veterinary medicine. Those objections depend on the danger that results from the animal falling when in a state of insensibility, and the expense necessarily incurred. Nor must the degree of excitement induced by the ether-vapour at the commencement of its action on the system be disregarded; hence the necessity of some means being devised by which the horse can be secured, and, when the influence of the agent has become established, laid in the position favorable to the performance of the required operation. The safest expedient is that of casting the animal before its administration.

Many forms of inhalers have been advocated. The late Professor Sewell suggested and perfectly succeeded with a very simple contrivance, consisting of

a bladder containing pieces of sponge saturated with from 6 to 8 ounces of ether, and surmounted with a mouth-piece of vulcanised gum-elastic. This he placed over one nostril of the horse, ox, or sheep, and the bladder being dipped in warm water, the animal was allowed to inhale and exhale freely atmospheric air with the other nostril. A few minutes sufficed to bring about etherization; and, generally, this state lasted sufficiently long to allow of all the ordinary operations being performed. If however, returning sensibility manifested itself too soon, the apparatus was again applied to the nostril for a short time. Ether as an anæsthetic agent has now given place to chloroform.

Barium.

This metal was obtained by Sir H. Davy by subjecting its hydrated oxide to electrolytic action in combination with mercury, when an amalgam was formed at the negative electrode. The mercury being distilled off, barium remained. It may also be procured by passing the vapour of potassium over *baryta* heated to redness in an iron tube. The reduced barium is to be removed by means of mercury, and this afterwards distilled off.

Barium is a metal of a steel grey colour, specific gravity above 2. Symbol Ba. Atom 69. It rapidly

absorbs oxygen, and when gently heated burns with a red light. Projected into water it decomposes it, evolving hydrogen, and forming a solution of baryta.

The oxide of barium or baryta.—Ba.O=77, occurs native in combination with carbonic and sulphuric acids; but it may be procured by exposing the nitrate of baryta to the action of heat in a large porcelain crucible, when it remains behind in the form of a porous mass or grey powder. It has a strong alkaline taste, and combines rapidly with water, evolving much heat, and a *hydrate* is formed.

Hydrate of baryta is soluble in 20 parts of cold and 3 of boiling water. This solution is a very delicate test for carbonic acid, becoming quickly covered with a film of carbonate of baryta when exposed to the air. It is also powerfully alkaline and poisonous.

Carbonate of Baryta.—This compound, called *Witherite,* with the sulphate or *heavy spar,* is found in large quantities in Wales, Westmoreland, Cumberland, and other places. The carbonate, although sparingly soluble in water is poisonous, probably in consequence of its being acted on by the acid in the stomach. Artificially it may be formed by adding to the nitrate or chloride in solution, an alkaline carbonate: generally the carbonate of ammonia is preferred.

Composition.—1 atom	Baryta	. . . =	77
1 ,,	Carbonic acid	. =	22
	Equivalent	. .	99

Chloride of Barium.—This compound is prepared by dissolving the native carbonate in hydrochloric acid, filtering the solution, and evaporating till a film appears, then setting aside to crystallize.

Composition.—1 atom	Barium	. . . =	69
1 ,,	Chlorine	. . =	36
2 atoms	water	. . . =	18
Equivalent of crystallized salt		. .	123

Properties and Uses.—The crystals of chloride of barium are flat four-sided tables, colourless and transparent. About forty-three parts are taken up by 100 of water, and this solution is kept to test the presence of sulphuric acid or the sulphates; it being so delicate that a millionth part of sulphuric acid may be detected by it. Sulphate of baryta is insoluble in every menstruum except hot concentrated sulphuric acid.

Nitrate of Baryta may be obtained in the same way as the above, substituting nitric acid for hydrochloric. It crystallizes in transparent, colourless, octohedrons, soluble in 8 parts of cold and 3 of boiling water. It is used for the same purpose as the chloride of barium.

Properties and Uses.—Occasionally the barytic salts are employed in veterinary medicine, but with doubtful efficacy. They are nearly all poisonous, except the sulphate, which is harmless. The safest antidote, therefore, for the soluble salts, is the sulphate of soda; and in poisoning by the carbonate it has been proposed to use a mixture of vinegar with an alkaline sulphate. They give a greenish yellow tinge to the flame of spirit of wine, and with the exception of the sulphate are all soluble in dilute nitric and hydrochloric acids. A saturated aqueous solution of strontia is the best for the salts of baryta.

Mr. Percivall has recorded several experiments with these compounds on farcied and glandered horses; from which it would seem that on which the most reliance, if any, can be placed, is the chloride of barium, given in doses of from ʒss to ʒij, and repeated in the course of the day, if found necessary. It is safer to begin with the smaller quantity, and very gradually to increase it; but should inappetence be produced, the agent must be immediately withheld for a time, otherwise poisoning may result, of which he adduces more than one instance.

BELLADONNÆ EXTRACTUM, *Extract of Deadly Nightshade.*

This is the inspissated juice of the leaves of a

plant indigenous to Britain and the south of Europe. It is found growing in shady places, where the soil is calcareous, flowering in June, and ripening its seed-vessels in September. The roots are said to possess the most activity, although the leaves are commonly employed medicinally. In order to prepare the extract, these are bruised in a morter, a little water being first poured over them; they are then submitted to pressure, and the juice evaporated until it has acquired a fit consistence.

Composition.—An alkaloid, denominated *atropia,* and those proximate principles of the vegetable which are soluble in water.

Properties and Uses.—The odour of this extract is peculiar, and its taste bitter. Its action is that of a narcotic and sedative, relieving pain and lessening both the force of the pulse and the number of its beats; hence its use is indicated in all those diseases where an undue action of the nervous and vascular systems is present, as tetanus, carditis, and pneumonic affections generally. Mr. W. Mavor, to whom, I believe, the profession is indebted for the introduction of this therapeutic, employs it largely, and speaks very highly of it, as do many other practitioners. It is given in doses of from two to four drachms. In larger doses it acts gently on the bowels; thus showing its influence is sometimes on mucous surfaces, though generally its effects are

most marked on the nerves, and, through them, on the circulation.

Externally it is occasionally applied to the eye, and, by its action on the radiated fibres of the iris, it powerfully dilates the pupil. The same effect I have witnessed from a large quantity having been administered internally. In the form of plaster, it may be beneficially applied to wounds creating much irritation, particularly in such as have given rise to tetanus, for its influence in all neuralgic affections, when used topically, is even greater than that of opium. A watery solution may likewise be injected into the bladder, to allay irritation in that viscus. By some practitioners it is advocated as an antispasmodic, to which there can be no objection.

Bolus Armenia Rubra, *Armenian Bole.*

This earth should be obtained from Armenia. It is an argillaceous clay, of a deep red colour, and contains a small portion of the peroxide of iron; but red chalk, ground and made into cakes, is now largely substituted for it in the English market.

Many of these kinds of earth were formerly used in medicine, called "Sealed Earths," and they were much prized on account of their supposed absorbent and astringent properties: this alone remains, and it is employed wholly for the sake of its colour.

Armenian bole is still advocated by those of the

old school; but those of the modern can do very well without it.

Calx Chlorinata, *Chlorinated Lime.*

This term is applied by the College of Physicians to the compound of chloride and lime long known in the arts by the name of chloride of lime, or bleaching powder. It is made by passing a stream of chlorine gas (obtained by the action of sulphuric acid on the chloride of sodium and peroxide of manganese, or by the decomposition of hydrochloric acid by means of the peroxide of manganese) through hydrated lime placed on shelves in a chamber, the lime being kept in agitation by a spindle having cross arms attached to it. When the lime has ceased to absorb chlorine, the compound formed is removed.

Composition.—This perhaps, has not yet been accurately determined. Dr. Thompson asserts, that a compound is obtained in Glasgow, consisting of one equivalent of chlorine and one of hydrate of lime; but as ordinarily procured, according to Brande, bleaching powder consists of

1 atom Chlorine	$=36$
2 atoms Hydrate of Lime. .	$37\times2=74$
Equivalent. .	110

In its perfect state it may be a hydrated chloride of lime, or as viewed by some writers, a compound of hydrated hypochlorite of lime with chloride of Calcium.

Properties and Uses.—Chlorinated lime is in the form of a white powder, emitting a weak smell of chlorine, and having an acrid caustic taste. It is only partially soluble in water; the lime which is uncombined with chlorine remaining comparatively unchanged. Exposed to the air, it becomes decomposed; chlorine is evolved, and a carbonate of lime formed.

It is a valuable disinfectant. In order to understand its action, it is necessary to bear in mind that the fetid gases given off during the decomposition of vegetable and animal substances are mostly compounds of hydrogen with certain bases. When chlorine is brought in contact with these, it decomposes them, in consequence of the great affinity it has for hydrogen, with which it unites, and sets the bases free.

Mr. Youatt in 1828, and afterwards Mr. W. Simpson, Mr. T. Holford, and Mr. J. Kerr, in the pages of 'The Veterinarian,' first drew the attention of veterinary surgeons to this valuable compound in fistulous affections, open joints, canker, and cases of grease. But it will be found serviceable in many other diseases. To Mr. Youatt we are indebted for its

introduction as a remedy in hoven in cattle and tympanitis in the horse, being given in doses of from ʒij to ʒiv suspended in water. A solution of it, in the proportion of a pound to a gallon of water, is recommended as an application for mange, by Mr. R. Lucas; and, in slight attacks, it will be found effectual in removing the disease. A solution thus made may be employed as an ordinary excitant of wounds, and particularly in such as have taken on unhealthy action. In fact, I feel assured, that the more this compound is known and used, the more highly will it be prized.

It will also be found extremely useful for purifying stables rendered foul by the virus of glanders, mange, or any other contagious disease, the walls being washed with a diluted solution of it. The common practice of merely whitewashing the walls serves only to cover the infectious matter, and, perhaps, to preserve it for an indefinite length of time, so that, when the lime scales off, disease may be again engendered by the exposed virus, whereas this compound decomposes it.

In phagedænic and farcy ulcers the chlorinated lime being sprinkled over them has quickly induced a healthy condition, and the healing process has soon become perfected.

The pharmaceutical compounds are,

SOLUTIO CALCIS CHLORINATÆ, *Solution of Chlorinated Lime.*

Take of Chlorinated Lime	. . . .	1 pound,
Distilled Water	. . . . .	1 gallon.

Set aside, and filter for use as required.

Of this strength it is used for mange, and as a stimulant and mild erodent to ill-conditioned wounds and fistulous sores. Diluted with from ten to fifteen times its bulk of water, it may be employed to form an antiseptic lotion for virulent grease, exfoliating bone, &c.; also for the formation of poultices, and as a disinfectant for foul stables.

UNGUENTUM CALCIS CHLORINATÆ, *Ointment of Chlorinated Lime.*

Take of Chlorinated Lime	. . .	1 to 2 parts,
Hog's Lard	. . . . .	8 parts.

Mix together so as to form an ointment.

This compound has been had recourse to with very beneficial results in cases of grease, particularly when the fœtor has been considerable. It is best made as required.

CAMPHORA, *Camphor.*

This has been considered a concrete essential oil; but chemists now view it as an oxide of *camphene*, a

principle found largely in volatile oils. Its sources are principally two—a camphor laurel, growing abundantly in the woods of North America, China, and Japan, from the roots and smaller branches of which it is obtained by distillation with water in large iron pots having earthen heads attached filled with straw, and on which the camphor concretes;—and a tree that is found in the forests of Sumatra and Borneo, in the centre of which, when arrived at maturity, the camphor exists in a concrete and crystalline state, occupying the space usually filled in other trees with pith. Young trees yield only an oil, which resembles a solution of camphor in oil of turpentine; and from it, by evaporation, camphor may be obtained.

Camphor, as it is brought into the market in its crude or rough state, is very impure. It is purified by sublimation in glass vessels, called *bombaloes*, a little quick lime being added to it.

Composition.—10 atoms	Carbon .	$6 \times 10 = 60$	
8 „	Hydrogen .	$1 \times 8 = 8$	
1 „	Oxygen. . . .	$= 8$	
	Equivalent .	76	

Properties and Uses.—Camphor is sold in concavo-convex cakes, of two or three inches in thickness. It is white and brittle, pulverizing, however, with

difficulty, from its unctuous nature, unless a little alcohol be added. Its odour is agreeable and penetrating; its taste bitter and aromatic. It is sparingly soluble in water: an ounce at 212° takes up only one grain, and cold water half a grain; by it the odour and pungency of the camphor are obtained. Impregnated with carbonic acid, water takes up a much larger quantity; and it is readily dissolved by alcohol, the fixed and volatile oils, and strong acetic acid. It is inflammable, and burns with much smoke. Camphor is a narcotic, and may be given in doses of from ʒj to ʒij. It both diminishes the frequency of the pulse and softens its tone; and if long exhibited, it acts on the kidneys; at least such were the effects I perceived to result from experiments made by me in order to ascertain its action: therefore I do not object to its being employed as a febrifuge, in combination with other substances. Externally applied, it has been extolled as a discutient and anodyne for chronic sprains, bruises, and tumours, and also for infiltrations into the cellular tissue: for which purpose one part of camphor may be dissolved in four parts of oil, strong acetic acid, or rectified spirit, and this may be rendered more potent by the addition of a little essential oil of turpentine. Another form under which camphor is employed is the compound liniment of soap. Added to either the ointment or oil of cantharides, it considerably

allays the irritation caused by the flies, and is consequently a valuable adjunct.

Camphor has been occasionally given in tympanitis, and it has been supposed to act by rousing the vital energies. In a state of fine powder it is sometimes sprinkled over a linseed-meal poultice, when it has been found to allay irritation; although as a sedative, thus applied, it is not equal to the extract of the deadly nightshade.

On account of its sedative influence, it may be advantageously combined with opium or digitalis for chronic coughs. Given for any length of time, it pervades the system, and is excreted by the lungs and kidneys.

Incompatibles.—Dr. Paris says it is not affected by any substance with which we are likely to combine it.

CANTHARIS, *Cantharides, Blistering-fly.* Vulgo: Spanish Fly.

The name of Spanish flies was given to these insects because they were first brought from Spain. They abound in the south of Europe; occasionally single specimens have been caught in England, and lately Belgium has been visited by vast numbers. They are found on different trees, such as the ash, elder, poplar, lilac, privet, and Tartarian honey-

suckle, which they soon deprive of verdure. They are dislodged by shaking the trees, and afterwards killed by exposure to the fumes of boiling vinegar, and then dried in the sun. Their existence is known in a locality by the offensive odour emitted, and which sensibly affects many persons, inducing ardor urinæ and ophthalmia. The market is now principally supplied from Sicily.

Composition.—This is involved in some obscurity. The active principle of the fly has been designated *cantharidine.* It is obtained by treating a decoction of the fly with alcohol and afterwards with ether. It occurs in small crystalline plates, or flattened four-sided prisms, having an appearance not unlike spermaceti. Besides this essential principle, there have been found, phosphate of lime and magnesia, a little uric, acetic, and phosphoric acids, a green and a yellow fixed oil, and a yellow viscous substance, some black matter and osmazome. Cantharidine, by some chemists, is considered to be a solid volatile oil. Its chemical composition, according to Renault, is $C_{10}H_6O_4=98$. It is soluble in many menstrua, especially when hot; such as the oil of turpentine, acetic acid, olive oil, &c.; but from some of these it separates on cooling, either partially or entirely. When, however, it exists in its natural combination with the yellow and other oils, then its retention by these menstrua may be more per-

fect. The best solvent appears to be chloroform, whether hot or cold. Pyroxylic spirit also readily dissolves it, and the use of this for veterinary purposes will be found to possess its advantages, since by a solution of this kind, a form for which is given hereafter, we can localize the action of the blister. It is offered as a substitute for the more expensive etherial solution of the human practitioner, and has been found very effective.

Mr. T. Hurford informs me that in India he employs, instead of the *Cantharis vesicatoria*, the *Mylabris cichorii;* and he finds it to be far more active, so much so that, for his ordinary blister, he only uses a drachm and a half of this fly to eight ounces of lard or acetic acid. Moreover, he adds, it has this advantage, it does not affect the kidneys. Is the mildness of his form the reason? Probably our formulæ are too powerful, and may be advantageously reduced in strength.

This fly—the mylabris cichorii—appears to have been the blistering beetle of the ancients, as "both Dioscorides and Pliny refer to several kinds of cantharides, but remark that the most powerful are those with transverse yellow bands on their wings." Pereira considers it probable they were used by the Greeks and Romans, and states that they are employed at the present day in China, and some parts of Hindostan.

Subsequently to the above having been sent to press, I received from India, kindly forwarded by Mr. Hurford, a quantity of the "mylabris" for the purpose of experiment. A blistering ointment was at once made, according to the proportions laid down by him, and applied to the hocks of two horses in the College Infirmary. Its action, in both instances, was decided, and all that could be desired: therefore I have no hesitation in saying that, as a blistering agent, the fly is a very active one. Further experiments, however, will be required to be made so as to establish any advantages it may seem to possess over the cantharis vesicatoria. Moreover, as yet it is not an article of commerce. Professor Redwood, of the Pharmaceutical Society, has informed me that several parcels of these flies have been obtained by private individuals; who, having tried them on the human subject, found them to be as powerful a vesicant as the Spanish flies.

A smaller fly, very much resembling the mylabris, has been met with in the market, from China.

Properties and Uses.—Cantharides should be chosen small and perfect, about two thirds of an inch in length, and one fourth in breadth; oblong in form, and of a shining golden green colour; dry, free from dust and mould, and unpreyed upon by an acarus or mite. Despite, however, of all precautions, this parasite will be found, at times, feeding on the

parenchymatous part of the fly, but it appears to leave untouched the acrid active principle. Sometimes other beetles are mixed with them, particularly the *melolonthæ vitis*, which may be known by their being larger and of a squarer form.

Administered internally, cantharides act as a powerful diffusible stimulant and diuretic. Of late years they have come more into use, from their having been recommended by Mr. Vines, in combination with the vegetable bitters, as a stimulating tonic in cases of debility accompanied or not with anasarca; also in farcy and glanders, and some other affections. To him the veterinary profession is indebted for the steadiness with which he has followed up their employment, from which much benefit has been derived. The dose is from five to eight grains, given daily; but whenever diuresis supervenes, the agent is to be withheld for a day or two. As an ordinary diuretic, cantharides are seldom given, since they have a peculiar tendency to irritate and inflame the neck of the bladder, and cause strangury.

Their great consumption is as vesicatories. When applied to the skin, they inflame it, and cause the exhalents to pour out a quantity of serum, which, raising the cuticle from the cutis, forms a blister; and this they do more certainly and effectually than any other agent. The formulæ given for blistering

compounds are exceedingly numerous, but the less complicated they are the better.

To ensure the full action of a blister, the hair should be removed as much as possible; and if the legs are the parts to be acted upon, the influence of the vesicant will be more energetic and much quickened by the immersion of them for fifteen or twenty minutes in warm water. To other parts fomentations may be applied, or a poultice, by which the vessels of the skin will be relaxed and rendered more susceptible of the stimulating influence of the cantharidine. In about six hours after the application of the blistering compound, which must be effected with friction applied the contrary way to the hair, vesication will have taken place; and, on the following day, it is advisable to cleanse the part by repeated affusions of warm water, and afterwards apply the liniment of lead, or some emollient, by means of a soft painter's brush.

To promote the growth of hair, a weak ointment of cantharides, in the proportion of one to twenty parts or more of lard, or the acetous infusion largely diluted, may be applied with friction until action in the skin is induced by it. The Tincture of Iodine has been resorted to for the same purpose.

Repeated blisters have their advocates. The action of a blister, however, may be kept up for an almost indefinite period by dressing it with the Savine Oint-

ment. In the absence of this, a milder form of the blistering ointment may be employed.

ACETUM CANTHARIDIS, *Vinegar of Cantharides.*

Take of Cantharides, in powder . . . 1 part,
Dilute Acetic Acid . . . . . 8 parts.

Digest in a water-bath for two or more hours, and filter for use.

OLEUM CANTHARIDIS, *Oil of Cantharides.*

Take of Cantharides, in powder . . . 1 part,
Olive Oil . . . . 8 parts.

Digest in a water-bath for two or more hours, and filter for use.

TINCTURA CANTHARIDIS PYROXYLIC, *Pyroxylic Tincture of Cantharides.*

Take of Cantharides in powder . . . 1 part,
Pyroxylic Spirit . . . . . . 6 parts.

Macerate for fourteen days, and filter for use.

UNGUENTUM CANTHARIDIS, *Ointment of Cantharides.*

Take of Cantharides, in powder . . . 1 part,
Hogs' Lard . . . . 6 parts.

Digest together in the water-bath for two or more hours, and filter while hot through bibulous paper.

That which remains on the filter, being mixed with an equal weight of lard, will answer for ordinary hospital use.

Having in the above simple formulæ made some alterations, I believe them now to embrace all required by the veterinary surgeon; the first form is the mildest, it being well known that the cantharidine is largely deposited from *cold* acetic-acid. If any addition be made, it should consist of a small quantity of Camphor, in the proportion of about one part to eight of the blistering compound, by which its irritative effects will be lessened.

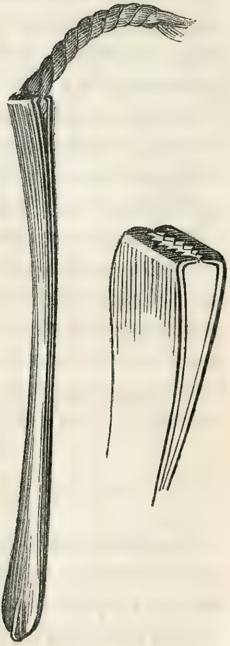
The active principle of the blistering fly being readily extracted by the oil of turpentine, I was induced some time since to make known to the profession a method for medicating tape, cotton-cord, or any other material used for setons, and it has been found to answer all its intended purposes.

Take of Cantharides, in powder . . .	1 part,
Oil of Turpentine	8 parts.

Digest, with a very gentle heat, for fourteen days, frequently agitating; then filter, and to every ounce add an equal quantity of the Canada balsam; intimately mix them, and immerse the material to be medicated. When it has imbibed as much of this as it will, take it out, and draw it through the finger and thumb, giving gentle compression, so as to

remove any of the superfluous mixture; then hang it up to dry.

As the ordinary seton-needle would not carry the cotton cord, which was preferred on account of the quantity of the terebinthinate solution of cantharidine it absorbed, another was invented by me. See *subjoined sketch.*



Setons thus medicated will be found to excite the suppurative inflammation in the thick skin of cattle, and this action is also more quickly induced in the horse than by the common method.

Mr. T. Darby, of Louth, has improved the material for setons for cattle, by making it to consist of hemp and horse-hair twisted together; which he uses either medicated or not.

Capsici Baccæ, *Capsicum Berries.*

The capsicum plant is a native of the East and West Indies, but largely cultivated in England, both as an ornament and for the sake of its berry or fruit, which is a conical pod of an orange or red colour, containing a dry pulp and many flattish seeds.

The *capsicum baccatum* is most esteemed as a condiment; but the *c. minimum* is the most pungent.

Composition.—Cinchona, resin, mucilage, and a peculiar acrid principle.

Properties and Uses.—This well-known spice is introduced as an article of the materia medica for the sake of its powerful stimulating properties. It excites a genial glow in the stomach, which is imparted to the system generally, but the pulse is seldom accelerated by it. It may be given in doses of from gr. x to xx.

Carui Semina, *Caraway Seeds.*

The plant yielding these seeds is indigenous to Great Britain. In Essex it is largely cultivated for the sake of its seeds, which are perfected in the second year of its growth, in the month of July or August, when the umbel is thrashed out on a cloth. In the market, seeds of foreign importation are met with, but the English are preferred.

Properties and Uses.—Caraway seeds are of a brown colour, curved, ridged, and about one fourth of an inch in length. They should be chosen fresh and plump; having an aromatic odour, and an agreeable, sweetish, warm taste: properties depending on the presence of an essential oil, in which resides their activity. They are carminative and stomachic, and may be given to the horse in doses of from ʒss to ℥j. For cattle, the dose is from ʒj to ʒij. They may be fairly allowed to take the place of the whole list of seeds that were so liberally employed by old practitioners, such as anise, cummin, coriander, fennel, and others. They should not be ground until they are about to be administered, and for this purpose a hand-mill will be found highly serviceable.

CASCARILLÆ CORTEX, *Cascarilla Bark.*

The tree yielding this bark is a native of the Bahama islands, and is also found in Jamaica and St. Domingo. It comes into this country packed in chests and bales.

Composition.—Bitter principle, mucilage, resin, volatile oil, water, and much woody fibre.

Properties and Uses.—Cascarilla bark is in the form of curled pieces or quills of a brownish colour, and covered with a thin epidermis beset with lichens. It has an agreeable spicy odour, and breaks with a

short close fracture: when burnt, it emits the smell of musk. It is both tonic and aromatic, and may be given in doses of from ʒij to ʒiv. I was led to introduce this agent from the recommendation of it by the late Mr. J. J. Rogers, who informed me that he employed it with much advantage, and spoke highly of its effects.

CATAPLASMA, *a Poultice*.

As a therapeutic this is usually placed among emollients. The common relaxant cataplasm of the College consists of bran moistened with warm water to which is added a little linseed meal, in order to give it tenacity. Care should be taken that it is kept moist; which may be effected by pouring over it, from time to time, warm water. I am not inclined to assent to the statement, that it is of little consequence whether you apply a poultice hot or cold because it will soon become of the same temperature as the part to which it is applied. In the effects produced by medicinal agents, the impression first made by them is often of moment. When a cold substance is applied to an inflamed surface, there will necessarily be a withdrawal of heat from it; the constringing effects of cold will then be experienced, and sometimes much pain. On the other hand, when warmth, accompanied with moisture, is applied,

the particles are driven farther from each other, the part becomes relaxed, the distended vessels are enabled to relieve themselves, and ease is obtained. Sometimes, however, a cold poultice is desirable, and then even ice may be applied. The effects produced by poultices likewise depend very much upon the materials composing them. Thus, as a means of softening horn in inflammation of the feet, vinegar may be used instead of water. When an astringent is desirable, a solution of alum may be added. When a disinfectant, the chloride of lime is invaluable; or a poultice containing yeast or charcoal may be employed. A boiled carrot-poultice has been found of service in ill-conditioned ulcers and irritable sores; and we have an excellent stimulating compound in the mustard cataplasm or *sinapism*, made by mixing together equal parts of mustard and linseed meal, with a sufficient quantity of boiling water so as to form a poultice. Vinegar used to be employed, but it does not increase the effects of the mustard. When speedy action is required, the flour of mustard may be used alone, made into a paste with diluted water of ammonia, and some practitioners add the oil of turpentine, which, however, is not admissible in nephritic diseases. If we are desirous of allaying irritation, opium or the diacetate of lead, may be added to the common cataplasm; so that in this, as in all other branches of the practice

of veterinary medicine, judgment on the part of the medical attendant is required.

Catechu Extractum, *Extract of Catechu.*

This substance was originally brought from Japan, and was supposed to be an earth; hence it received the name of Terra Japonica, *Japan earth.* It is now known to be an extract obtained from a tree—the Acacia Catechu—which grows plentifully in India, particularly in the mountains of Kauhana in Hindostan. Its mode of preparation is this:—The tree being felled, the exterior white wood is removed, and the interior dark-coloured cut into chips. These are put into narrow-mouthed unglazed vessels, and covered with water, which is evaporated to one half its bulk by the application of heat. The decoction is now poured into a flat earthen pot, and further evaporated: afterwards it is exposed to the sun, and when the extract has acquired considerable thickness, it is spread upon a mat which has been previously covered with the ashes of cow-dung. Lastly, it is cut, by means of a string, into portions, and these are completely dried by frequently turning them in the sun.

The market is supplied with this extract both from Bombay and Bengal, and it comes into this country in chests, boxes, or bags.

		Bombay Catechu.	Bengal Catechu.
Composition.—	Tannin	109	97
	Extractive	68	73
	Mucilage	13	16
	Impurities	10	14
		200	200

Another form of the extract in porous cubes of a reddish colour is obtained from the leaves, called *Uncaria Gambia.*

Properties and Uses.—It will be evident, on a reference to the analysis of each kind of extract, that the Bombay is the most valuable. They may be easily distinguished from each other. The Bengal is pale coloured, and is met with in flat, square, or round pieces; whilst the Bombay is in round masses, having a rusty iron hue without, and a chocolate tint within; its taste, also, is more austere and astringent. When pure, both are nearly dissolved either by water or spirit.

Catechu may be considered as the most valuable of the vegetable astringents, and is given to the horse in doses of from ʒj to ʒij. For CATTLE, this quantity may be doubled. For the DOG, the dose is from ℈j to ℈ij.

It is rarely given alone. Frequently it is added to chalk and opium, a mixture which use has rendered allowable, although the alkalies and their car-

bonates, with a solution of lime, cause precipitates with tannin. Aromatics are advantageously combined with it. It may be given to the horse in the form of ball, as follows:

Astringent Mass.

Take of Extract of Catechu, in fine powder, and
Cinnamon Bark, of each . . . ℥j,
Common Mass . . . . ℥vj.

Mix together, and divide into balls weighing an ounce each, one of which may be given two or three times in the day.

CHLOROFORMYL, *Chloroform.*

Take of Chlorinated Lime	4 pounds,
Rectified Spirit	½ pint,
Water	10 pints,
Chloride of Calcium, broken in fragments	1 drachm.

Put the lime first mixed with the water into a retort, and to these add the spirit, that the mixture may fill only the third part of the retort. Then heat in a sand bath: and when ebullition first commences, remove the fire as quickly as possible, lest the retort be broken by the suddenly increased heat. Let the solution distil into a receiver as long as there is nothing which subsides, the fire being restored if it

be at all needed. Add four times as much water to the distilled liquid, and shake all well together. Cautiously separate the heavier part as soon as it has subsided, and to this add the chloride, and shake occasionally during an hour; finally let the fluid again distil from a glass retort into a glass receiver.

Decomposition.—The above formula is that given by the College of Physicians, which, according to Phillips, is a ready and inexpensive mode of procuring the compound. The changes that take place are very complicated, resulting in the formation of a *terchloride of formyle* and a *formiate of limc.* The term chloroform has reference to its constituents—chlorine and formyle; the latter is an hypothetical base, consisting of C_2 H, to which oxygen being added, forms *Formic Acid* $C_2H\ O_3$, an acid first discovered as existing in the red ant, but also produced when the vapour of pyroxylic spirit is brought in contact with spongy platinum. The difference between this acid and chloroform is seen by the following formulæ:

Formic Acid	$C_2H + O_3$
Chloroform	$C_2H + Cl_3$

Chloroform is also obtained by the distillation of a mixture of lime and water, or a solution of potassa with *Chloral*, a fluid formed by passing dry chlorine gas, in large quantity, through anhydrous

alcohol; and then subjecting the compound to careful and repeated distillation off sulphuric acid, and to subsequent rectification over quicklime.

Fownes states that chloroform may be obtained as follows:—one part of hydrate of lime is to be suspended in twenty-four parts of cold water, and chlorine passed through the mixture until nearly the whole of the lime is dissolved. A little more hydrate is then added to restore the alkaline reaction, the clear liquid mixed with one part of alcohol or wood spirit, and after an interval of twenty-four hours, cautiously distilled in a very capacious vessel. A watery liquid, containing a little spirit and a heavy oil, collect in the receiver; the latter, which is the chloroform, is agitated with water, digested with chloride of calcium, and rectified in a water-bath. This differs from the College formula only in the indirect employment of chlorinated lime, rather than the direct.

Composition.—It will have been gathered from the above that chloroform is a terchloride of formyle, or

2 atoms Carbon	$6 \times 2 =$	12
1 atom Hydrogen	$=$	1
3 atoms Chlorine	$36 \times 3 =$	108
Equivalent		121

Properties and Uses.—Chloroform is a transparent colourless fluid, somewhat oleaginous in appearance, having a specific gravity of 1·48 to 1·5 very

volatile, of a fragrant smell and sweetish taste. It is very slightly soluble in water, but undergoes solution in ether, oil of turpentine, and alcohol. It readily dissolves camphor, caoutchouc, cantharidine, and the gum resins. It boils at about 140°, and is with some difficulty inflamed, burning with a greenish flame.

Its vapour, when inhaled, produces insensibility, as that of ether does, but more rapidly and effectually than it. As an anæsthetic for the horse, it is only necessary to cause a piece of sponge, held in the hand in a piece of bladder, to imbibe from one to two ounces of chloroform, and bring it near one nostril during inspiration, while the other is closed. This being continued for a short time, temporary insensibility takes place. Smaller animals are quickly affected by it, and these also require no apparatus for its administration.

It has been conjectured that the action of ether, chloroform, and the allied substances used for the purpose of inducing insensitiveness, from their being hydro-carbons, is referable to the conversion of their contained carbon into carbonic acid, and their hydrogen into water, by the oxygen of the blood. This, however, is disputed by Dr. Snow, who avers that they pass out in the expired air, unchanged, and are detectable in the urine, and even in an amputated limb, or a dead body. We have, at any rate, proof here given that they enter the blood, and they produce their depressing influence on the ner-

vous system, by temporarily paralysing the brain and spinal cord. Mr. G. W. Varnell destroyed a horse while under the influence of chloroform, by opening the carotid artery; and he found the blood to smell strongly of the agent, and not to coagulate as it ordinarily does.

Tests.—Absence of colour, odour pleasant, its specific gravity not less than 1·48. Not soluble in water, nor does it redden litmus; quickly evaporates when rubbed on the skin, producing coldness; does not coagulate albumen; and remains colourless when agitated with ether.

Clysters, or Glysters.

The common form of these agents for the horse is a liquid; occasionally, however, gaseous enemas are resorted to. The objects for which they are administered are,

1. In order to empty the bowels of fæces; thus they act as an aperient. Also to induce a cathartic to commence its operations, when, from want of exercise or due preparation, it is tardy in producing the desired effect. They operate in a two-fold way: —first, by softening the contents of the intestines, and, secondly, by exciting irritation in one portion of the canal, which is communicated throughout the whole; hence they become valuable when the nature and progress of the disease require a quick evacuation of the bowels.

The usual enema is warm water, the quantity thrown up being from half a gallon to a gallon. This may be rendered more stimulating by the addition of common salt, or oil, or aloes.

The quantity of the fluid injected should be attended to; for if this be too great, in addition to the action of the agent given, we shall have a distended state of the intestine, and there will follow a more rapid expulsion of the clyster than is desirable; and, on the other hand, it should not be too small, for then the object is not obtained. Various methods are adopted for exhibiting enemas: the best is certainly the pump invented by the late Mr. Read.

2. For the purpose of killing worms, which are found nidulating in the rectum and large intestines. In this case they are usually of an oleaginous nature.

3. For restraining diarrhœa; sedatives and astringents being then employed.

4. For nourishing the body, when food cannot be received by the mouth. Gruel is generally the aliment thus given.

5. For allaying spasms in the stomach and bowels. In this instance they become one of the means by which medicines are taken into the system.

The only gaseous enema is that of tobacco, which is occasionally employed in cases of severe colic, obstinate constipation of the bowels, and strangulated intestines. The simple method proposed by the late

Mr. S. V. Gregory, as described in *The Veterinarian*, vol. xii, page 241, may be resorted to; or the more scientific one given by Professor Simonds in the 'Proceedings of the Veterinary Medical Association' for the Session 1838-9, who speaks highly of the influence of this narcotic agent in extreme cases.

Colchici Cormus, *Cormus of Colchicum Autumnale, or Meadow Saffron.*

The colchicum, or meadow saffron, is met with in moist meadows throughout Europe. Its cormus, sometimes called a bulbo-tuber, is about the size of a chesnut, solid, fleshy, and enveloped in a brown-coloured integument. It is at perfection in the month fo June or early in July, and is considered to possess the greatest activity when the leaves have withered, and the flowers of the new corm have not appeared.

To preserve it, the College of Physicians directs the cormus to be cut transversely into thin slices before drying, the rind being previously peeled off. The slices should be dry, firm in texture, and of a greyish-white colour, having a bitter and somewhat acrid taste.

Composition.—According to Pelletier and Caventou, the alcaloid veratria with gallic acid in excess, fatty

matter and a volatile acid, yellow colouring matter, starch, gum, inulin, and lignin.

Properties and Uses.—In large doses colchicum acts as an irritant poison: in small and repeated ones it proves a diuretic and diaphoretic, and, if long continued, laxative; these effects being followed by sedative action. To the horse it may be given in doses of from ʒj to ʒij, combining it with the nitrate of potassa.

Dr. Lemann has directed the attention of the members of the veterinary profession to this agent by an article on CONSTITUTIONAL OPHTHALMIA, in '*The Veterinary Record,*' vol. i, p. 132, in which he states that the treatment of this disease caused him much trouble and anxiety at first, but that he has now obtained the mastery of it. A case is there related by him. Reflecting, he says, on the very unsatisfactory results attending the usual mode of treatment, and which in this instance had also failed, he was induced to view the disease as resembling rheumatism in the eye of the human subject, and he resorted to the use of those remedies always found by him successful in cases of rheumatism of the human eye, and other parts. He gave the pulverised corm in doses of two drachms at first, morning and evening, combining it with the nitrate of potassa; but after four doses had been administered the bowels became relaxed, and it was considered prudent to suspend

the medicine, lest inflammation of the mucous lining membrane should supervene. On the fourth day a decided improvement of the eye was perceived, and the colchicum was given in drachm doses twice a day; which being continued for three days, all the unfavorable symptoms disappeared. To this succeeded several similar cases, and the result in each case was the same,—restoration of the organ to apparent health.

Dr. Lemann has also had recourse to this drug in cases of pneumonia with decided benefit.

Mr. Herbert Hallen advocates its use in rheumatic affections in the horse generally.

One of my resident pupils, Mr. B. Cartledge, communicated to me three instances of constitutional ophthalmia, for which he successfully administered the meadow saffron. The usual remedial means had been resorted to, such as bleeding, setoning, &c., and these proved, as they too often do, ineffective. Being consulted, he at once commenced giving the pulverised corm of colchicum, as recommended by Dr. Lemann; and, after the exhibition of a few doses only, a marked change was perceptible; and by steadily persevering in its employment for the period of ten days, all the inflammation disappeared, and the eyes soon regained their natural appearance.

Cattle have been known accidently to partake of the meadow saffron while grazing, and it frequently

proves poisonous to them. Mr. Evers Musgrave has recorded an instance of eight calves being thus destroyed. (See *Veterinary Record*, vol. ii, p. 223.)

It would appear, from the above statements, that the corm of the colchicum merits a place in the pharmacy of the veterinary surgeon. Of its influence on the system I have no doubt; and as its active principles are readily extracted by diluted alcohol and vinegar, perhaps other forms may be advantageously introduced than that of powder. Some practitioners give preference to the seeds, from their being, when ripe, more uniform in composition; and others employ a tincture, or the acetous extract.

Collodion.

When starch is mixed with concentrated nitric acid, it forms a transparent colourless jelly, which being added to water, yields a white, curdy insoluble substance, called *Zyloidine*. The allied substances undergo a similar change, and paper thus treated assumes the appearance of parchment, when dry, and acquires a high degree of combustibility. But if the ligneous principle, in the form of *cotton wool*, be steeped in a mixture of nitric and sulphuric acids, and afterwards thoroughly washed and dried, another substance results, according to Fownes, designated *Pyroxyline*, a far more combustible compound, and commonly

known by the name of Schoenbein's *gun-cotton*. Both appear to be substitutive compounds, the elements of nitric acid replacing, to a certain extent, those of water in the starch and lignine, and hence by some writers they are viewed as a peroxide or a nitrate of lignine. Similar compounds may be obtained from linen, tow, or flax, and even purified sawdust.

It would seem that their composition has not yet been accurately determined, but they are said to differ in the proportions of their ultimate elements, and also in their combustibility and solubility in ether.

COLLODION is formed by dissolving gun-cotton in ether containing a little alcohol. The most facile mode of procuring it, however, is as follows:

Take of	Sulphuric Acid	300 parts,
	Dry Nitrate of Potassa . .	200 ,,

Mix them together in a stone ware or porcelain capsule, and add, as quickly as possible,

Carded Cotton	10 parts,

stirring it in with a glass rod. Allow the whole to remain in contact for five or ten minutes, then withdraw the cotton, wash it in distilled water so as to remove all the acid, and next press and dry it with a gentle heat: this is *gun-cotton*.

Take of	Gun-cotton	8 parts,
	Sulphuric Ether	125 ,,
	Alcohol	8 ,,

Agitate these together until a solution more or less perfect results, which is *Collodion.*

By some persons it has been thought that, for medical purposes, that which has been denominated ELASTIC COLLODION, is to be preferred. This may be made by adding to the above,

Venice turpentine,
Castor Oil, and
White Wax, of each 2 parts.

Melt these together, and add sulphuric ether, 6 parts. Incorporate the whole, and keep in a closely-stopped bottle.

Either form of collodion will be found available for veterinary purposes. The agent has been resorted to for muscular lesions, whether lacerated, incised, or punctured; also for open joints, &c., it being laid on by means of a large camel's hair pencil, or otherwise applied. For the benefits resulting from its employment in wounds, see Cases in the *Veterinary Record,* vol. v, p. 38, by Mr. G. W. Varnell and Mr. G. T. Brown. In open joints by Mr. T. Taylor, p. 146; and of open parotid duct, by Mr. T. W. Gowing and Mr. B. Cartledge, pp. 238 and 376.

From an article by me, in the same journal, the following remarks are extracted:

"Collodion possesses remarkable adhesive proper-

ties. A piece of linen or cotton cloth covered with it, and made to adhere by evaporation to the palm of the hand, will support, after a few minutes, without giving way, a weight of from twenty to thirty pounds. Its adhesive power is so great, that the cloth will commonly be torn before it gives way. The collodion cannot be regarded as a perfect solution of the cotton. It contains, suspended and floating in it, a quantity of the vegetable fibre which has escaped the solvent action of the ether. The liquid portion may be separated from these fibres by a filter, but it is doubtful whether this is an advantage. In the evaporation of the liquid, these undissolved fibres, by felting with each other, appear to give a greater degree of tenacity and resistence to the dried mass.

"In the preparation of collodion it is indispensable to avoid the presence of *water*, as this renders it less adhesive: hence the ether, as well as the alcohol, should be pure and rectified. The parts to which the collodion is applied should be first thoroughly *dried*, and no water allowed to come in contact with them until all the ether is evaporated.

"As to the way in which it should be applied, Mr. Maynard observes that 'In slight cuts a moderately thick coating of the solution, laid over the incised parts, was found, on becoming dry, sufficient to keep the lips of the wound in position till union

took place; but in most instances it was employed in conjunction with straps of cotton and sheepskin, and with raw cotton, forming with them strong, unyielding, adhesive straps, bandages, and encasements: and, after many experiments, he was convinced that this is the best and most effectual way in which it can be employed as an adhesive agent in surgery. The solution dries rapidly, and in a few seconds; by the evaporation of the ether it contains, it becomes solid and impermeable to water; and a strap moistened with it, and glued to any part of the cutaneous surface, adheres to it with a tenacity that is truly surprising.'

"Dr. Bigelow's directions for the appliance of this agent are as follow:—'For straight incisions, of *whatever length*, provided the edges can be brought together without great difficulty, it is better to apply the solution in immediate contact with the skin, as follows:—The bleeding should be arrested, and the skin thoroughly dried. If the lips of the wound are themselves in contact, the surgeon has only to apply a coating of the solution lengthwise over the approximated edges by means of a camel's hair pencil, leaving it untouched after the brush has once passed over it till it is dry, during, perhaps, ten or twenty seconds. This first film will of itself have confined the edges together; but, in order to increase the firmness of the support, more must then be applied

in the same manner, allowing it to extend on either side of the incision half an inch or more. If, however, the wound gapes, an assistant is required to bring the edges in contact, and retain them so whilst the application is made. If the incision is so long that the assistant cannot place the edges in apposition throughout the whole extent, begin by covering a small portion at the upper end, and apply the solution to the lower parts as fast as it becomes dry above. In this case something more than the film which is left adherent to the skin will be necessary for a safe and proper support to the wound, which may have a tendency to separate. The transparency of the dressing may be still maintained by adapting a piece of goldbeater's skin or oiled silk to the wound. This should be covered with the solution, and the membrane applied after the coating is on and already contracted. A dossil of lint, or a strip of cloth, or even a piece of tissue paper, which is thus rendered tough and waterproof, will answer the same purpose, though not transparent. Where there is much separation, it is better to fortify the wound in this way at once, and as fast as the first coating is applied and dry. "If, however, adhesion by first intention be not desired, the gum may be painted on in traverse strips, like adhesive cloth, letting the first strip dry, and giving it the goldbeater's skin support before the second is applied. Thus room is left for the

escape of pus, and the exposed portion may be watched without removing the strips.' "

"Mr. Erasmus Wilson, reporting on the effects of collodion, in the 'Lancet,' finds it to possess four important properties, namely,

"'First. That of a mild stimulant.

"'Second. That of an efficient substitute for the natural scarfskin.

"'Third. That of a mechanical compress.

"'Fourth. That of an adhesive glue, from which quality it derives its name.

"'First. As a stimulant, it is fitted to exert a local alterative action on the congested capillaries of a chronic ulceration, and give activity to the healing process.

"'Second. In its character of a substitute for the absent scarfskin, it is transparent, pliant, and more or less impermeable, according to the thickness of the layer that may be required.

"'Third. Its most remarkable property, as it seems to me, is the contraction which occurs during the desiccation of the collodion, and which produces a local pressure of considerable power on the surface to which it is applied.

"'Fourthly. The glue-like property of the collodion is evinced in its adhesion of cut surfaces, a property which is much increased by the contraction above mentioned.'

"Since the introduction of this agent, other well-known adhesive compounds, dissolved in different menstrua, have been tried; for instance, gutta percha in sulphuret of carbon, and chloroform; and caoutchouc in the same fluids and ether, respecting which Dr. Simpson says:—

"'Gutta percha readily, I find, dissolves in chloroform. When a thin layer of this solution is spread upon the skin or any other surface, the chloroform rapidly evaporates, and leaves a film or web of gutta percha, possessing all the tenacity and other properties of that substance. A layer of it, of the thickness of good writing-paper, has perhaps as much strength and tenacity as to hold the edges of a wound together, with all the required firmness and strength of sutures. When a film of it is placed upon the skin, and is allowed to dry thoroughly for a few minutes, the subsequent attempt to separate it is like peeling and tearing off the epidermis after erysipelas, &c. It then forms, as it were, at once a kind of artificial tissue, epidermis, or skin, which adheres strongly for a time. There is one disadvantage pertaining to it. In the course of a day or two it generally dries and crisps up, like court plaster, at its edges. If we could either increase its adhesiveness, or destroy its tendency to dry and crisp, we should render it more useful. I have seen the addition of a little caoutchouc apparently correct it in these respects.

"'The deposit or 'plaster' left by the solution of gutta percha is far more equable, smooth, and skin-like, than that left by the solution of gun-cotton.

"'A solution of caoutchouc in bisulphuret of carbon, ether, or chloroform, leaves a very thin, but perhaps less regular web, and one which stretches too readily for most practical purposes.

"'One great deficit in this class of dressings is the want of a menstruum sufficiently powerful, and, at the same time, not stimulating like ether or chloroform. This objection may, perhaps, in practice be got over, by applying an unstimulating solution of isinglass or the like to the raw surface, before applying the stimulating solution of the gun-cotton or gutta percha. Or the first layer of gutta percha or gun-cotton may be made very thin, so as to evaporate almost instantaneously, and then afterwards a series of superincumbent layers may be added till the web is of the required strength. Other better substances for solution may, perhaps, be found; but no material has a chance of succeeding unless it be insoluble in water after it is consolidated, and unless it be sufficiently strong in its texture, and possesses powerfully adhesive properties.'"

As a substitute for *Collodion*, an alcoholic solution of shell-lac has been found to answer extremely well. It is to be spread on linen or silk. It does not irritate, and adheres firmly; and wounds have

been found to heal rapidly when covered with this mixture.

It should be made of such a strength as to form a viscid solution when cold.

Copaiba, *Copaiba*. Vulgo: Balsam of Capivi.

This liquid resin is obtained from the *copaifera langsdorfii*, by boring the tree near the base of its trunk, whence it flows abundantly. The tree is found in South America and the West India islands. The market is principally supplied from Brazil, it being imported in casks containing from one to two hundred weight.

Properties and Uses.—Copaiba is a transparent viscid fluid, of a pale yellow colour, having a peculiar odour and a pungent nauseous taste. Its appearance in the shops differs considerably, which has been thought to arise from the manner of its procuration, or the trees whence it has been obtained. It is often much adulterated, being mixed with castor oil and turpentine. The presence of the former is detected by agitating in a bottle one part of liquor ammoniæ with two and a half of copaiba: if the mixture remains cloudy after standing at rest for some time, it contains castor oil. The other sophistication is not so readily exposed, on account of the composition of the balsam.

Its action is that of a diuretic, and it may be

given in doses of from ʒss to ʒj, either floating upon water or formed into an emulsion with mucilage or the yolk of an egg. It has been extolled in *hæmaturia;* but whether it has any properties, beyond conveniency of form, to recommend it above the turpentines, I cannot take upon myself to say.

Composition.—Essential oil and resin. If pure, these are in the proportion of 40 of the former to 60 of the latter. When it is desirable to give the balsam of copaiba in the form of ball, it may be conveniently done by the addition of an eighth part of its weight of calcined magnesia, or one-fifteenth of hydrate of lime, either of which, on the application of heat, will solidify the balsam; the latter, however, more quickly than the former.

When given in a fluid form, it may be mixed with the liquor potassæ, or a solution of caustic soda; and when thus saponified, it is said to be more efficacious.

Creasoton, *Creasote.*

This substance is obtained by the destructive distillation of vegetable matters; hence it is found in pyroxylic oil, tar, and wood-smoke, giving to those substances their antiseptic properties. Its preparation is exceedingly troublesome and tedious. It essentially consists in subjecting to distillation wood-tar, which yields a light and a heavy oil; from the

latter any adhering acetic acid is removed by carbonate of potassa: "it is then mixed with caustic potassa, heated, and afterwards separated again by the action of diluted sulphuric acid; it is then once more distilled, mixed with phosphoric acid to abstract a little ammonia, and ultimately rectified with water." For the complete purification of creasote, the addition of potassa, followed by neutralization and distillation, requires to be frequently repeated.

Composition.—This is not definitely ascertained: it is designated an *oxy-hydrocarburet.* The following may be accepted as approaching nearly to its constitution:—

14 atoms	Carbon	$6 \times 14 =$	84
9 ,,	Hydrogen . . .	$1 \times 9 =$	9
2 ,,	Oxygen	$8 \times 2 =$	16
	Equivalent		109

Properties and Uses.—Creasote, when pure, is a colourless fluid, oily, and of a peculiar odour, resembling smoked meat; it has a hot pungent taste; a specific gravity of 1·037; boils at 397°, and does not congeal at —50°. It burns with a sooty flame, and coagulates albumen; hence it has been used for restraining hæmorrhages. With water, and the fixed and volatile oils, it forms an opalescent mixture, but readily dissolves in alcohol, ether, naphtha, and acetic acid. It acts powerfully on the animal system, and

quickly destroys small animals. Given internally, it is a stimulant and tonic; and externally, when applied in an undiluted state, it is a caustic; otherwise, it acts as a gentle excitant, and antiseptic. It has also been resorted to as a styptic: indeed, its greatest use is as a topical remedy, being employed in the form of a lotion, a liniment, or an ointment, to foul ulcers, such as occur in farcy and glanders—to cancerous sores, such as foot-root, canker, and thrush —and some cutaneous affections, as herpes, mange, &c.; also for the checking of caries, excessive suppuration, and the repression of fungous granulations. It is likewise occasionally dropped into the eye in chronic ophthalmia, when it operates as a counter-irritant; and has been found effectual in removing nebulæ. The inhalation of its vapour has lessened the bronchial secretion; and as glanders, in the human subject, has yielded to it in the hands of Dr. Elliotson, and this formidable disease was effectually combated with it by the late Mr. Ions, in the case of his son, it seems to be worthy of a trial for this affection in the horse, being both given internally and applied locally. The dose has not been ascertained. I should think from ʒss to a drachm may be diffused in a weak mucilage of gum, and administered twice a-day, or oftener.

As a caustic, undiluted creasote may be applied by means of a camel's-hair pencil. Injected into fis-

tulous wounds, or those connected with exfoliation of bone, it quickly induces a favorable change, acting in a twofold manner—first, as a powerful stimulant, and, secondly, as an antiseptic. It may be diluted with water when used as a styptic: pledgets of tow are to be dipped into it, and applied to the bleeding part with a compress. Its action depends on its power of coagulating albumen, and at the same time it contracts the mouth of the vessels.

As a lotion to indolent and foul ulcers, or when thrown up the nostrils for chronic inflammation of its lining membrane, or when ulcers exist on it, from ten to fifteen minims may be diffused in an ounce of water; and of the same strength it may be added to a poultice when we wish to destroy fœtor in a wound, or lesion.

There are those who entertain some doubts whether, as a topical agent in veterinary practice, this compound will supersede the use of the pyroligneous oil of tar, in which creasote largely exists, and to which it owes its influence. Common soot from coal has been substituted when creasote could not be obtained, as much being mixed with lard as could be incorporated so as to form an ointment; and a watery decoction of it has been made when a lotion was preferred.

The pharmaceutical formulæ of creasote are,

Linimentum Creasoti Compositum, *Compound Liniment of Creasote.*

Take of	Creasote	2 parts
	Oil of Turpentine, and	
	Olive Oil, of each	4 parts

Mix together, so as to form a liniment.

This form has been successfully employed at the College in wounds that have taken on unhealthy suppurative action, and particularly for fistulous sores. In lesions connected with opened synovial cavities, I should think it would also prove beneficial. In cases of canker in the ear of the dog it has been found highly efficacious. Professor Simonds, however, prefers a spirituous solution, in the proportion of one part of creasote to eight parts of rectified spirit, of which from 5 to 10 drops are introduced into the ear daily.

Unguentum Creasoti, *Ointment of Creasote.*

Take of	Creasote	2 parts
	Lard	8 parts

Mix together.

Used for the same purposes as the compound liniment of creasote.

Creta Præparata, *Prepared Chalk.*

Chalk is a most abundant mineral, occurring

massive in beds which traverse a range of hills commencing in Yorkshire and continuing into Dorsetshire, and giving to the cliffs of Britain, on the southern side of the island, their peculiar character.

It is found of various colours, and mixed with many impurities. White chalk is preferred for medicinal purposes. After having been levigated, the coarser particles and all adventitious matters are removed by washing: when dried, it becomes an impalpable powder.

Composition.—Chalk is a friable carbonate of lime, consisting of,

1	atom	Carbonic Acid	=22
1	,,	Lime (C_a O.)	=28
		Equivalent .	50

Properties and Uses.—Prepared chalk is of a white colour, tasteless, adhering slightly to the tongue, inodorous, and nearly insoluble, one part requiring 1600 parts of water to dissolve it. In water impregnated with carbonic acid gas, it is, however, much more soluble. As a medicinal agent, chalk is placed among the astringents; but, in the strict meaning of the term, it is not an astringent, as it does not condense or corrugate animal fibre. Its action principally depends upon the chemical property it possesses of uniting with acids, and forming new compounds, the affinity which binds carbonic acid with

the base, lime, being very weak: hence in diarrhœa, when an acid secretion is largely poured out from the mucous follicles of the intestines, it neutralizes this fluid, and thus stays the profuse alvine evacuations by removing the cause of the irritation. Generally it is advisable to precede its administration by a laxative. The dose for the horse may be from ℥ij to ℥iv, suspended in a weak mucilage of gum. Opium may be added with advantage, and aromatics; and although substances which contain tannin are considered incompatible with it, yet by common consent, when we are desirous of obtaining astringent effects, the extract of catechu may be combined.

As an external application, chalk will be found valuable as an absorbent and antacid, and may be sprinkled over ulcers discharging a thin ichorous fluid; also abrasions, &c.

In CATTLE practice the use of chalk is advocated under the same circumstances as for the horse. The dose will vary from two to four ounces. It would seem that, for both classes of animals, it is better to give this absorbent in combination with astringents and aromatics. A form will be found, at page 112, for sheep and calves. These remarks will also apply to the DOG. The dose for him is from 10 to 20 grains.

Tests.—Its purity is known by its colour, and by its being entirely soluble, with effervescence, in hydro-

chloric acid, by which the absence of silica is shewn. If ammonia is added to this solution, no precipitate should take place; and thus its freedom from alumina and oxide of iron is indicated.

Incompatibles.—It is decomposed by the acids and acidulous salts, which, by combining with its base, set the carbonic acid free.

Croton Tiglii Semina, *Croton Seeds.*

The purging croton is a native of India, Ceylon, Java, China, and other places. Every part of the plant appears to possess medicinal properties; but the seeds are alone employed in Europe. These are contained in triocular capsules, each seed being oblong, and of the size of a small coffee-bean. Its shell is blackish, and covered with a yellowish brown epidermis, which frequently is rubbed off by friction, from the cases in which the seeds are imported most commonly not being full.

The parenchymatous structure abounds with a fixed acrid oil, which is obtained by expression, constituting the croton oil—*tiglii oleum*—of commerce. It has a bright straw colour, a faint odour, and a hot acrid taste, creating an uneasy sensation in the throat, which continues for many hours. It is soluble in alcohol and ether.

Composition.—100 parts of the kernels of the seeds, when bruised, yield

60 parts of this oil
40 parts of farinaceous residue.

Or, perhaps, a better analysis is that of Dr. Nimmo:

27·5	acrid matter
32·5	fixed oil
40	farinaceous residue.
100	

The fixed oil is merely a vehicle for the acrid principle, which is called *tiglin* by Dr. Paris, and *crotonic acid* by Brandes, the whole of which cannot be expressed from the seed, but a portion remains commixed with the farina. The employment of this residuum, denominated *croton cake,* or *farina,* has been advocated by several practitioners; but since great uncertainty must exist as to the quantity of the active principle which remains, I think it would be better to make use of the decorticated seeds.

I believe that the veterinary profession is indebted to the late Mr. J. Field for the introduction of this agent as an article of its materia medica. He employed the farinaceous residue, and found five grains of it were equivalent in action to one drachm of aloes. Should the seed be given, about three grains, or perhaps a little less, may be considered the equivalent.

The expressed oil has been said to create considerable irritation. Allowing this to be the case, surely some corrective may be conjoined, and thus a valuable agent be added to the list of veterinary therapeutics.

The great value of croton certainly arises from the capability of administering it when no other cathartic can be given. It may be put into the animal's mash; or, if it is made into a tincture, as suggested by Mr. Field, it may be mixed with his water. A form for this is as follows:

TINCTURA CROTONI, *Tincture of Croton.*

Take of Bruised Croton Seeds	. .	1 ounce,
Rectified Spirit	. . . .	16 ounces.

Digest for seven days, and filter for use. Dose from half an ounce to an ounce.

A slight opalescence of the water to which it is added will take place; and so long as this exists, the active principle may be considered as being held suspended. Externally applied, this spirituous solution is an active counter-irritant; but I do not think it possesses any advantages over many others.

From having carefully noticed the action of this therapeutic, I am inclined to believe that it requires nearly the same time to excite the bowels of the horse that aloes does. It differs, however, from aloes, in

not creating so much nausea, and in producing a greater liquidity of the dejections.

A knowledge of this would indicate its employment in anasarcous swellings and effusions into cavities, when purgatives are admissible; also in affections of the kidneys, when we are desirous to avoid irritating them, which is sometimes done when even aloetic purges are exhibited.

As a general cathartic, croton will never supplant aloes; but a combination of the two purgatives may, perhaps, be found of advantage in many cases.

It has been ascertained that croton oil placed on the tongue of the horse, in quantities varying from 20 to 40 drops, effectually produces purging. A knowledge of this fact is valuable, as there are some diseases incidental to that animal in which neither a ball nor a draught can be given, and he also refuses food, yet it is desirable that a purgative should be administered. The only objection that can be urged against the exhibition of croton in this way is, that it inflames the buccal membrane; and the same effect, although in a less degree, is caused when the farinaceous residuum is given, either in the form of draught or in a mash.

For Cattle, the union of croton with the sulphate of magnesia, or any other cathartic agent, in doses of from 20 to 30 grains, is now commonly had recourse to; and it has been found effectual in over-

coming obstinate constipation, and especially in those cases which require the bowels to be quickly acted upon.

I have found a terebinthinate solution of the acrid principle of croton seeds a most powerful irritant to the skin of the ox. It causes rubefaction and much swelling of the surrounding parts, followed by a vesicular eruption and subsequent desquamation of the cuticle, and thus it becomes valuable as a counter-irritant. For general purposes it will require dilution with some fixed oil, as that of the olive or rape-seed. The form I have adopted for the solution is as follows:

Take of Croton Seeds, bruised	. .	1 part
Oil of Turpentine	. . . .	8 parts

Macerate for fourteen days, and filter for use.

CUPRUM, *Copper*.

This metal has long been known, it having been used by the ancients, who were unacquainted with malleable iron, for domestic and other utensils. It is found in most parts of the globe, but the richest copper mines now exist in Cornwall. The ore most abundant is the sulphuret, from which the metal is usually extracted by reduction. This operation consists essentially in driving off the sulphur by heat,

oxidizing the iron with which it is mixed, and converting it into a silicate by means of sand, when the copper is separated in a tolerably pure state. However, to render it quite pure, it undergoes repeated fusions, the last being carried on in the refining furnace with the addition of a little charcoal. After this it is beaten with hammers, and is then fit for sale.

Pure copper has a yellowish-red colour, and much lustre. It emits a peculiar odour when rubbed, and has a disagreeable taste. It is hard, sonorous, malleable, and ductile. Specific gravity, 8·788 to 8·958. Atomic weight, 32.

Animals feeding on the herbage growing in the neighbourhood of copper-smelting furnaces, are frequently the subjects of several diseases. About Swansea, horses and cattle are much affected by the disengaged fumes, which are found to contain arsenious acid, as before stated at p. 60. In the language of the miners, they have the "copper-smoke disease."

Young animals are most susceptible of their influence; and among the most marked effects are a disposition to ophthalmia, which in general quickly runs on to its termination in cataract; enlargements of the knee and hock-joints, and periosteal exostosis of the bones of the extremities.

The first indications of animals being thus affected

are dulness and refusal of food. On examination, the teeth will be found encrusted with a bluish concretion, the gums tumid and red, and the saliva secreted in increased quantities—symptoms analogous to ptyalism.

Diseases of the joints show themselves by what appears to be a distension of the bursæ; a small fluctuating tumour first presenting itself, which contains a fluid resembling synovia; this becomes viscid, and at last forms a nidus for the deposition of bony matter. If, however, it be punctured in the early stages, and exit given to the imprisoned fluid, adhesion of its parietes may be brought about by compression. The knees of horses, and the knees and hocks of cows, are the joints most commonly attacked. The periosteal exostosis of the long bones sometimes attains to such magnitude, that the covering of the bone is burst, and necrosis ensues. The constipation of the bowels which accompanies the early stages of the disease is often very obstinate, and requires the most active purgatives to overcome it.

Accidental wounds in these situations frequently take on unhealthy action. Whether this arises from the peculiar state of the system or of the air, cannot be decided. The breeding of animals is never attended with success, and they lose flesh very quickly.

CUPRI AMMONIO-SULPHAS, *Ammonio-Sulphate of Copper.*

Take of	Sulphate of Copper	2 parts,
	Sesqui-carbonate of Ammonia	3 parts.

Rub together in a glass mortar till the effervescence ceases, wrap the mass in bibulous paper, and dry it by means of a very gentle heat. Preserve in a stoppered bottle.

Decomposition.—The constitution of this compound appears to be very uncertain. During the act of mixing the compounds much of the carbonic acid gas is evolved; the mixture becomes of a deep blue colour, and probably the sulphuric acid of the sulphate of copper combines with the ammonia set free, while the remaining carbonic acid unites with the oxide of copper, which forms a mixture with the excess of susquicarbonate of ammonia. Brande says, "Sub-sulphate of copper, sulphate of ammonia, and carbonate of ammonia and copper, are among its usual constituents; and when it has been dried at a very low heat, and not unnecessarily exposed to air, the proportion of carbonate of ammonia which it retains is ofter considerable."

Properties and Uses.—This salt had given place by general consent to the sulphate of copper, which, probably, for the purposes of the veterinary surgeon, possesses all that he requires; but Mr. I. Jekyll,

having advocated the use of the ammonio-sulphate in that insidious and too frequently fatal disease, pleuro-pneumonia in cattle, I have been induced to re-insert it. It is, doubtlessly, a stimulating tonic and astringent, and may be given in doses varying from ʒj to ʒij, combining it with some carminative, and repeating the dose two or three times a day. The form recommended by Mr. Jekyll is made extemporaneously by dissolving one part of sulphate of copper in four parts of water, and then adding solution of ammonia till a precipitate begins to fall. Of this compound he gives four drachms every eight hours, when the use of a tonic agent is indicated.

A similar solution to this is used as a test for the presence of arsenious acid.

Tests.—Heat converts it into oxide of copper, the ammonia being evolved. Dissolved in water, the colour of turmeric is changed brown by it, and a solution of arsenic rendered green.

Incompatibles.—Acids; the alkalies soda and potash, and lime-water.

CUPRI DIACETAS IMPURA, *Impure Diacetate of Copper.*

Old Names: Ærugo, Verdigris, Subacetate of Copper.

Nearly all the salts of copper are recognised by their blue colour, and, according to Phillips, they

are compounds of the black oxide of the metal. Verdigris is chiefly made in those countries where wines abound, such as the south of France. Plates of copper are covered with the husks of the expressed grapes, which being moistened with water, are allowed to remain at rest, so that the acetous fermentation may be set up, during which the metal becomes oxidized, and the acetic acid that is disengaged, combining with it, forms the oxide into an acetate. This is scraped off, well beaten in mortars, and then compressed into leathern bags, in which state it is imported.

A purer acetate may be made by subjecting plates of copper to the vapour of acetic acid. In this country an artificial compound, known by the name of *English verdigris,* is formed by triturating together sulphate of copper and acetate of lead; and, to render the deception more complete, stalks of raisins and pieces of metallic copper are added to it. Verdigris is frequently adulterated with chalk, plaster of Paris, and other impurities: this is commonly the case when it is sold in the form of powder. These may be detected by dissolving the suspected compound in diluted sulphuric acid, which decomposes the verdigris, forming a soluble sulphate; while the adventitious substance will be precipitated. Good verdigris should also dissolve in hydrochloric acid, without effervescence.

Composition.—Verdigris, as it usually occurs in commerce, is a very impure salt, consisting of the diacetate and carbonate of copper, with portions of metal unacted upon, grape-stalks, and other substances. When pure, it is an hydrated diacetate of copper, and consists of

2 atoms Oxide of Copper .	= 80
1 atom Acetic Acid . . .	= 51
6 atoms Water . . . 9×6	= 54
Equivalent	185

Properties and Uses.—Verdigris occurs as a hard dry mass, crystalline, inodorous, and having an austere metallic taste. Boiling water takes up about one fifth of its weight, the greater part of which is again deposited on cooling. Vinegar dissolves a much larger portion, and, by evaporating the solution, rhomboidal crystals are formed, which are slightly efflorescent in the air, and entirely soluble in water. This is called *distilled* or *crystallized verdigris.* It is a neutral salt composed of

1 atom Oxide of Copper	= 40
1 ,, Acetic Acid . .	= 51
1 ,, Water . . .	= 9
Equivalent . .	100

Although now but seldom given, the diacetate of copper is a tonic, and the dose may be from ʒj to ʒij.

Externally applied, it is an erodent and a detergent. As an erodent, it is sprinkled in the form of a fine powder over luxuriant granulations and warty excrescences. As a detergent and stimulant to indolent ulcers, a liniment has been directed to be made with it; but I have adopted the suggestion of Mr. Bracy Clark, that of substituting the sulphate of copper for the more expensive acetate, and it has been found equally efficacious; indeed, for veterinary purposes this compound may be generally substituted. (See page 234.)

The old form for the liniment is as follows:

LINIMENTUM ÆRUGINIS, *Liniment of Verdigris.*

Old Names:—Mel Ægyptiacum, Oxymel Æruginis.

Take of	Verdigris, in fine powder	9 ounces,
	Alum	6 ounces,
	Treacle	$1\frac{1}{2}$ pound.

To be boiled together until the compound assumes a brown colour.

Some persons in their use of this for canker very inconsiderately add sulphuric acid to it, and others nitric acid, forgetting the decomposition which of necessity takes place. If the acetate be not sufficiently powerful, it would be far better to employ the sulphate or the nitrate of copper at once, rather than to obtain these compounds at the expense of the acetate.

A useful detergent ointment may be thus made:

Unguentum Æruginis, *Ointment of Verdigris.*

Take of	Verdigris, in very fine powder	1 part,
	Common Turpentine, or Resin	1 part,
	Hogs' Lard	12 parts.

The pulverized verdigris to be added when the other ingredients are melted and removed from the water-bath, stirring them together until cold.

This is used as an application to foul ulcers, and occasionally in tarsal ophthalmia and for tetter.

Cupri Diniodidum, *Diniodide of Copper.*

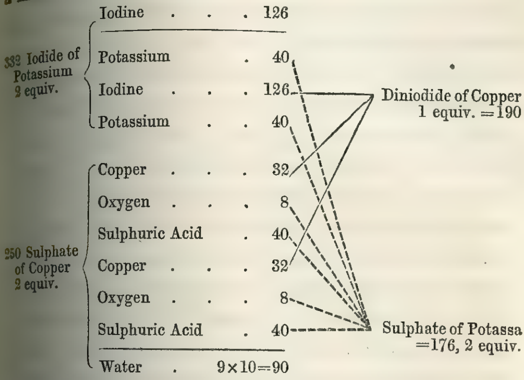
Take of	Iodide of Potassium . .	2 ounces,
	Sulphate of Copper . . .	4 ounces,
	Boiling Distilled Water .	$1\frac{1}{2}$ pint.

Dissolve the sulphate of copper in two thirds of the water, and the iodide of potassium in the remaining one third. When the solutions are cold, mix them. Set aside, that the precipitate may fall, which separate by means of a filter, and afterwards dry and pulverize it.

Decomposition.—On pouring a solution of the iodide of potassium into that of the sulphate of copper, mutual decomposition ensues; a diniodide of copper is precipitated, and a sulphate of potassa remains in solution, while some iodine is set free.

The following diagram may be accepted as repre-

senting the change that takes place; although it is somewhat more complicated than here given, for it appears that a small quantity of the *iodide of copper* is also formed on mixing the solution of the two salts; but this may be left unnoticed. The sulphate of copper being in excess in the formula, is likewise a matter of no moment.



Composition.—2 atoms Copper . = 64
1 atom Iodine . =126

Equivalent 190

Turner states, that this compound "is obtained by adding iodide of potassium to a solution of the sulphates of the protoxides of copper and iron, both in crystals, in the ratio of 1 to $2\frac{1}{4}$; when the protoxide of iron takes the oxygen of the oxide of copper, and

the iodine the metallic copper, forming a precipitate, the diniodide. It may be dried, and will bear a high temperature in close vessels without change."

Properties and Uses.—Diniodide of copper, as thus obtained, is of a light fawn colour, which undergoes some change on exposure to the air. It has the smell of iodine, a metallic taste, and tinges the skin yellow. With water it forms an opalescent mixture, which, after a time, takes up the iodine, as also does alcohol. In a mixture of alcohol and ammonia it undergoes nearly perfect solution; and if water of ammonia is alone employed, there are formed an iodide of nitrogen and an ammoniuret of copper. Its specific gravity is 3·0222. Its action is that of a stimulant to the absorbent vessels, and a tonic. It has been found of service in farcy, chronic œdematous enlargement of the legs, and those affections simulating glanders. It may be given in doses of from ʒj to ʒij daily, combining it with the root of gentian and some carminative, as pimento or Cayenne pepper. Cantharides in small doses may also be advantageously added. In larger quantities than these loss of appetite has been induced, followed by constipation of the bowels, which requires to be counteracted by a dose of laxative medicine. After it has been exhibited a short time, the iodine may be detected in the urine by the ordinary re-agents for the iodides.

An indication of its influence on the system is a soreness of the diseased parts, arising from its action on the absorbent vessels, when the agent should be for a time withheld. It appears to be a remedy possessing much power, and therefore calls for circumspection in its employment.

The well-known fact that the salts of copper rank among the most valuable tonic agents for the horse, and that all the mineral tonics, in order to produce their effects, are taken up into the circulation, coupled with the equally well-known influence of iodine on the absorbent vessels, first led me to think that a combination of these agents would be of service in farcy. The kindness of Professor Spooner and Mr. H. Daws enabled me to put the subject to the test of experiment, the result of which fully confirmed my expectations. Since then, I have received numerous communications bearing testimony to the benefits derived from its employment, so that it has now become an established article of the veterinary materia medica.

If given in those diseases that closely resemble glanders, or which soon degenerate into it if remedial means be not resorted to, I would advise the inhalation of diluted chlorine conjointly with it. By this agent the nasal membrane will be powerfully stimulated, and the secretion from it, although for a time increased, will ultimately be suppressed. The

plan to be adopted is very simple. Chlorine gas is to be liberated from hydrochloric acid by the action of the peroxide of manganese upon it. For this purpose a Florence flask, a stand, and lamp, are all that is required. As much chlorine is to be disengaged into the loose box in which the animal is placed as the attendant can resist the influence of; he then retires, taking his apparatus with him, and closes the door. Thus the atmosphere will be sufficiently impregnated, and the animal may be allowed to respire it for some hours; and, should it not have caused too much irritation, a repetition of the inhalation of the gas may take place during the day.

From the nature of these diseases, a somewhat long continuance of this mode of treatment will sometimes be found requisite, and it may be necessary occasionally to abstain from the use of the gas.

Topically applied, the diniodide of copper has been found a powerful excitant to ill-conditioned ulcers, quickly inducing healthy action in them; and in cases of chronic grease, when the ulcerated surface presents an unfavorable aspect, the residual liquor, after the obtainment of the precipitate, has been successfully made use of by Mr. Walton Mayer and Mr. H. Surmon, who speak highly in commendation of it, both in this disease and for farcy ulcers.

Cupri Sulphas, *Sulphate of Copper.*

Old names: Vitriolated Copper, Blue and Roman Vitriol, Blue Copperas, Bluestone.

The common names of this compound, *bluestone* and *blue vitriol,* are familiar to most persons; nor are there many, perhaps, unacquainted with its effects. Although this certainly does not detract from its value as a therapeutic, yet at times it seems desirable that we should be enabled to disguise it.

Sulphate of copper is prepared in several ways. The most common is stated to be by evaporating the water which flows from copper mines until a pellicle appears on its surface, and then setting it aside to crystallize. Secondly, by exposing the native sulphuret of copper to the action of heat, and afterwards to that of air and moisture, when the metal is oxidized and the sulphur acidified, and these combining, form a sulphate; which may be obtained by solution, evaporation, and crystallization. Doubtless a change analogous to this takes place in the copper pyrites existing in the mines, by which the water becomes charged with the sulphate; but I feel assured, from personal inquiries in the mining districts both of Cornwall and Wales, that very little of the salt under notice is now procured by the first-named method. The water of the mines, it is true, is often highly impregnated with it, but it is found

more profitable to precipitate metallic copper from the water by throwing refuse iron into it; and I was informed at Pary's Mountain, in the Island of Anglesey, that the precipitate thus obtained is much richer than the ore now taken from the mine. Thirdly, it may be procured by treating the oxide of copper ("copper scale") with sulphuric acid; or, fourthly, by boiling copper filings in the diluted acid, when the acid suffers decomposition; sulphurous acid fumes are given off, the metal is oxidized, and then converted into a sulphate. In one of these last-named ways by far the greater quantity of sulphate of copper is now made, and large manufactories for its formation exist in the neighbourhood of London.

The College of Physicians directs a purification of this commercial salt by solution and recrystallization,—an expedient rarely resorted to by the veterinary surgeon, it being generally sufficiently pure for all his purposes.

Composition.—According to the opinion of Berzelius, Prout, and Thomson, this compound is not a bisulphate of the peroxide, as it was once considered, but a sulphate of the black oxide, and consists of

1 atom Protoxide of Copper .		= 40
1 ,, Sulphuric Acid . . .		= 40
5 atoms Water . . .	9×5	= 45
Equivalent		125

Properties and Uses.—This salt occurs of a fine blue colour; its crystals are hard, of a rhomboidal figure, slightly efflorescent in the air, having a nauseous and metallic taste, and soluble in two parts of boiling water and four of cold.

Sulphate of copper is an astringent and tonic. The dose may be from ʒj to ʒij. The College directs a tonic mass to be thus made:

Tonic Mass.

Take of Sulphate of Copper, finely pulverized	.	2 oz.
Root of Ginger	ditto . .	2 oz.
Common Mass	. . . .	12 oz.

Beat together, so as to form a mass. Dose from 8 to 12 drachms.

At this establishment sulphate of copper used to be frequently given in large doses in cases of farcy and glanders. This is not the case now, repeated small doses being preferred. The former disease may readily have yielded to it, but the latter too often proved obstinate. The quantity then administered varied from ℥ss to ℥j, it being exhibited in solution, and blended with some demulcent, such as an infusion of linseed or gruel. The late Professor Sewell, to whom veterinary science is much indebted, ascertained by experiment that such doses as these could not be given with impunity in the form of ball, as the agent, while undergoing solution, cor-

roded the stomach; he therefore recommended the form of draught, and to commence with the lesser quantity, and gradually to increase it until a slight loss of the appetite was produced, which he considered indicated the attainment of the maximum dose. This was then steadily persevered in daily, omitting it, however, for a day or two, should the patient refuse his food.

The medicinal power of the sulphate of copper seems to be markedly determined to the mucous membranes; hence it is exceedingly useful in the chronic diarrhœa of CATTLE and SHEEP, the dose not exceeding two drachms for the former, nor more than one or two scruples for the latter. Also in nasal gleet in the horse, arising from chronic inflammation of the lining membrane of the nostrils; while in those cases of long-continued discharge from the nostril after catarrh and fever have subsided, accompanied with abrasion of the lining membrane, and enlargement of the submaxillary glands, to a certain extent simulating, and by some persons mistaken for glanders, it has seldom failed to be of permanent benefit, being administered in doses of two drachms or more daily.

Externally applied, it is an erodent. In solution it forms a valuable stimulant to foul and indolent ulcers. With alum this may be employed as a styptic to restrain hæmorrhages; likewise as a

topical application in cases of chronic ulceration of the skin of the heels, when the granulations are of a fungoid character; and a very weak solution is occasionally injected up the nostrils, or into the frontal or maxillary sinuses, as an astringent, when the lining membrane has taken on diseased action.

A saturated solution is directed to be kept in the pharmacy of this institution.

SOLUTIO CUPRI SULPHATIS, *Solution of Sulphate of Copper.*

Take of Sulphate of Copper	. . .	1 part,
Boiling Water	. . . . .	4 parts.

Dissolve and filter.

Also the following:

SOLUTIO CUPRI SULPHATIS COMPOSITA, *Compound Solution of Sulphate of Copper.*

Take of Sulphate of Copper and		
Alum, of each	. . . .	3 ounces,
Water	. . . .	2 pounds,
Sulphuric Acid	. . . . .	$1\frac{1}{2}$ ounce.

Dissolve the sulphates in the water by boiling, and then add the sulphuric acid.

The liniment (for want of a better term) before adverted to, is thus made:

Linamentum Cupri Sulphatis, *Liniment of Sulphate of Copper.*

Take of Sulphate of Copper, in powder, 1 part,
Treacle . . . . 4 parts.

Place together in a pipkin over a very slow fire, and simmer until the whole assumes a reddish-brown colour. Set aside for use.

Decomposition.—By the application of heat, a portion of the salt undergoes decomposition. Its water of crystallization is first driven off, then a part of its acid, and the oxide of copper imparts colour to the compound. A simple mixture of the sulphate of copper with treacle or tar, may, however, be advantageously substituted; and should custom demand the colour, this may be otherwise communicated, and thus much labour be saved. Care should be taken that no iron utensils are employed in the formation of this compound, as they will cause a precipitation of the copper in a metallic form. This remark will apply in all instances where the salts of copper are dispensed and moisture is present.

Uses.—This compound is employed as a detergent in phagedenic ulcerations, particularly of the sensitive parts of the foot, as canker, severe thrush, foot-rot, &c.

Tests.—Sulphate of copper is entirely soluble in water. If its crystals become green on exposure to

the air, this is owing to the presence of some sesquioxide of iron. It has been before remarked, that nearly all the salts of copper are characterised by their blue colour. Their presence when in solution is further indicated by ammonia, which gives a dark blue precipitate—*the ammoniuret of copper*—which is re-dissolved by excess of ammonia; by the ferro-cyanide of potassium, which forms a brown compound—the *ferro-cyanide of copper;* and by the immersion of a piece of polished steel, on which *metallic copper* will be precipitated.

Incompatibles.—The alkalies and their carbonates, many of the acetates, and all astringent vegetable infusions.

Sulphate of copper in large doses will frequently cause much gastro-intestinal irritation, followed by griping pains and violent purging. As an antidote, albumen may be administered, or milk, or wheaten flour: the ferro-cyanide of potassium may also be exhibited. Iron filings have been advocated, which precipitate the copper in a metallic form; and also sugar, the operation of which is not clearly understood, but it is supposed to act by converting the soluble cupreous salt into a comparatively insoluble carbonate of copper.

Digitalis Purpurea, *Purple Foxglove.*

This is an indigenous biennial plant, found growing,

in most of the counties of England, on elevated banks and hedgerows in sandy and gravelly soils. From a cluster of rich green leaves, the under surfaces of which have a purplish tinge, it sends up a flowering stalk three or four feet in height, which is terminated by a spike of purple flowers; the form of which has given to the plant its name, *digitalis*, this being derived from the German for "finger-hut." The English name foxglove is a corruption of folks'-glove. Those plants which grow wild and exposed to the sun are to be preferred, also such whose flowers are of a deep colour. The leaves, which are the parts medicinally employed, should be collected in the second year, just as the flowers are about to open, choosing those which are fresh and perfect. The mid-rib being removed, the remaining part of the leaf is to be quickly and carefully dried, either in a darkened room, or exposed to the sun, or on a tin dish before the fire. They may then be powdered or not; but they should be kept in opaque bottles, since by exposure to the air they lose much of their activity.

Composition.—Extractive and resinous matter, in which is found a vegetable alkaloid, *digitaline*, the active principle; ammonia and some earthy carbonates, and other salts.

Properties and Uses.—The leaves of digitalis, when fresh gathered, have but little smell, but by

drying they acquire a narcotic odour. When properly dried, they possess this peculiar odour, a fine fresh green colour, and a bitter taste. The state in which this drug is employed by some veterinary surgeons is highly discreditable to them. I have known it to be given after it has become nearly colourless, from having been kept in a drawer for several years. As it is an agent of much value, and can be cheaply obtained and prepared, digitalis should not be used after it is twelve months old.

The active principle of digitalis may be abstracted by hot water, when a very bitter solution is obtained. This being acidulated by sulphuric acid, a green resin is separated from it, in which the diuretic properties of digitalis reside.

Some writers place digitalis among the *narcotics* —agents which first excite and then depress the action of the heart, although the state of excitation is oftentimes unobserved. Others imagine that it acts directly as a *sedative*, there being no previous stimulation, nor any of those symptoms that usully accompany the operation of narcotics. Whichever be the correct view of its *modus operandi*, of the value of the agent there is no doubt. The dose is from 20 to 30 grains in the form of ball, and this may be repeated during the day. It has been given in much larger quantities, but I prefer the repetition of small

doses. When long exhibited, and in doses of from ʒj to ʒij, it acts on the kidneys ; as a diuretic, however, it can be well dispensed with. From what I have seen of the action of this drug, I should hesitate to give it during the existence of acute inflammation. Nevertheless, after the lancet has been freely used, or the bowels have been acted upon, it may be safely and advantageously employed. It retards the velocity of the pulse, and frequently causes it to become intermittent, which is an indication that the heart is under our control: the medicine should then be either withheld or administered in less quantities. I have not found this peculiarity of the pulse an invariable concomitant except when the system has been lowered by depletion or evacuants of some kind; but, when this is absent, I have observed that digitalis markedly diminishes the number of the pulsations within the minute.

Digitalis is a therapeutic which should not be employed without caution. It is characterised by sometimes accumulating in the system, and, after repeated doses have been administered, their effects are all at once manifested. Those that I have witnessed have been nausea, paleness of the mucous tissues, feeble and irritable pulse, with extreme langour, followed by a relaxed state of the bowels. In very large doses it seems at "one fell swoop" to palsy the heart and render life extinct, without any injec-

tion of the membranes or lesion of the tissues being perceptible after death.

Its use is advocated in pneumonia, hydrothorax, carditis, and many other diseases in which the action of the heart is inordinate; also in chronic cough. For the last-named, it is often advantageously combined with small doses of aloes, and the following form may be adopted:

Cough Ball.

Take of	Aloes, in powder . .	2 ounces,
	Digitalis	1 ounce,
	Common Mass . . .	13 ounces.

Beat together so as to form a mass. Dose, one ounce. This may be given twice in the day, depending upon circumstances: but its operation will require watching.

For Cattle and Sheep digitalis is beneficially had recourse to in combination with the nitrate of potash and the potassio-tartrate of antimony, for febrile affections, and those diseases involving the respiratory organs. The dose for the former is from half a drachm to a drachm twice or thrice a day; for the latter, from 5 to 15 grains.

To the Dog it may be given, in pulmonic and other diseases, in doses of a grain to two grains.

Occasionally a watery infusion of digitalis is employed as a sedative collyrium in ophthalmia.

FERRUM, *Iron*.

The ores of this metal are very abundant, being found in every part of the globe, either in veins or associated with those of other metals. Even entire mountains are sometimes met with formed of iron ore.

Native iron is rare, and is either terrestrial or meteoric. Iron pyrites, or the sulphuret of iron, and clay-iron stone, are the compounds of this metal most interesting to us. From the latter English iron is principally obtained. Here the metal exists in a state of carbonate, and in order to obtain it the ore is first broken into small pieces, and roasted, so to drive off the carbonic acid, thus leaving the oxide of iron. This is mixed with limestone and coke, and exposed to a strong heat in a blast furnace, when the lime combines with the alumina and silica, forming a species of glass which floats on the surface, while the carbon of the coke, uniting with the oxygen of the oxide of iron, is dissipated in the form of carbonic oxide and acid: the metal being thus left free and in a liquid state, it is run into moulds, constituting what is called *crude* or *cast* iron; by some, an *impure carburet*. This, besides iron, contains carbon, oxygen, silicon, and often sulphur and phosphorus. To separate these, it is again fused, the process being called "puddling;" and when it as-

sumes the consistence of paste it is pressed between rollers, so as to force out the remaining impurities, or it is struck repeatedly with forge-hammers: in this state it is denominated *malleable, forged,* or *bar*-iron.

The general characters of iron are familiar to most persons. It has a greyish colour and crystalline fracture; is malleable and ductile; not very easily fused, but possesses the property of welding to a remarkable degree, and is capable of receiving a very high polish. Its affinity for oxygen is great; hence it soon tarnishes. Its specific gravity is 7·77 to 7·8. Its atomic weight, 28.

But few of the compounds of iron are employed in veterinary practice. As they are all very valuable tonics, their number, perhaps, may be increased with advantage. Only one is used at this establishment, —the *sulphate.*

I have ventured to add the following:

Ferri Iodidum, *Iodide of Iron.*

Take of Iodine	6 ounces,
Iron Filings	2 ounces,
Distilled water . . .	4½ pints.

Mix the Iodine with four parts of the water, and to these add the iron. Heat them in a sand-bath, and, when it has acquired a greenish colour, pour off the

liquor. Wash what remains with the half pint of boiling water. Let the mixed and strained liquors evaporate at a heat not exceeding 212°, in an iron vessel, that the salt may be dried. Keep it in a well-stopped vessel, access of light being prevented.

Composition.—In this process one equivalent of iodine combines with one equivalent of iron to form a proto-iodide of iron, which, when crystallized, consists of

1 atom Iodine	. . . . . =	126
1 atom Iron	. . . . =	28
5 atoms Water	. . . 9 × 5 =	45
Equivalent	. . . . .	199

It is possible the following more simple form may be preferred by some persons:

Proto-iodide of Iron, by M. Kop.

Triturate 4 parts of iodine with 2 parts of water in a large dish, then add, at once, 1 part of iron filings in a state of fine division, and continue the trituration. In a few moments a considerable elevation of temperature will take place, and a disengagement of the vapour of iodine. Should this not result, the mixture is to be gently heated. The preparation is at first liquid, but it soon becomes solid.

Properties and Uses.—Iodide of iron occurs as an opaque crystalline mass, of an iron-grey colour, having a metallic lustre, and a styptic taste. It is

soluble both in water and alcohol; deliquesces on exposure to the air, from which it readily abstracts oxygen, when a sesqui-oxide of iron is formed. As a therapeutic it may be regarded as possessing the combined properties of iodine and iron; or it may be designated a tonic and alterative: the iron increasing the general tone and vigour of the system, while the iodine acts, as it is wont, upon the absorbent vessels. The dose may be from ʒss to ʒj. I have found it of service in cases of nasal gleet, accompanied with debility; and Mr. F. Cupiss speaks highly of it as a general tonic. It has also been successfully employed by Mr. Jos. Woodger in cases of diabetes, or that affection of the urinary organs of horses which so frequently supervenes on change of diet. It is rapidly absorbed; and both the iodine and the iron may be detected in the urine and other secretions by the usual re-agents.

Tests.—It emits violet-coloured vapours on the application of heat, and is entirely soluble in water.

Incompatibles.—The alkalies, their carbonates, most metallic salts, and all astringent vegetables.

Ferri Sulphas, *Sulphate of Iron.* Old Names: Salt of Steel, Green Copperas, Vitriolated Iron.

Take of Iron Filings . . . . . . 8 ounces,
Sulphuric Acid . . . . . 14 ounces,
Water . . . . 4 pints.

The sulphuric acid and water being mixed together, to these add the iron, and, when bubbles of gas cease to escape, filter through paper and evaporate so that crystals may form.

Decomposition.—Before the acid can act upon the iron, it must be oxidized: this is effected at the expense of the water, which being resolved into its constituents hydrogen and oxygen, the former escapes in the form of gas, and the latter combines with the metal. This oxide is now dissolved by the sulphuric acid, and by evaporation and crystallization the sulphate of iron is obtained.

Materials.			*Products.*
9 Water .	Hydrogen .	1	1 Hydrogen
	Oxygen .	8	
28 Iron		28	
40 Sulphuric Acid .		40	76 Sulphate of Iron.

The water is in excess for two purposes, namely, that it may dissolve the sulphate as formed, and also afford water of crystallization, to which the crystals owe their hardness, colour, and transparency.

Composition.—1 atom Protoxide of Iron		= 36
1 atom Sulphuric Acid		= 40
7 atoms Water .	9 × 7	= 63
Equivalent . . .		139

Properties and Uses.—Sulphate of iron has a bluish-

green colour, but by exposure to air it becomes wholly green, arising from an absorption of oxygen, which converts the protoxide of iron into the peroxide. The form of the crystal is that of a rhomboidal prism. It has a strong styptic taste, and is soluble in two parts of cold water, and less than its own weight of boiling water.

In commerce there is a compound known by the name of *green vitriol* or *copperas*, which is largely employed in the arts. This is made by exposing the native sulphuret of iron, roasted or otherwise, to the influence of air and moisture, when a crust of sulphate of iron is formed on the surface, by the metal being converted into an oxide, and the sulphur into sulphuric acid. The consumption of this salt for the purpose of dyeing being great, considerable quantities of it are made in the manufacturing districts. Thus, in the neighbourhood of Manchester, tons of the native sulphuret of iron may be seen strewed over arches made of brickwork, and exposed to the action of the air and rain. The ore undergoes the change already adverted to, and the sulphate being washed off by the rain, the solution is conveyed, by means of gutters, into a common reservoir, whence, from time to time, it is ladled out, and afterwards evaporated in leaden boilers, refuse iron being added, on account of there being an excess of sulphuric acid present. The point of crystallization being gained, the solution

is now put into large leaden tanks, across which cord is stretched, or branches of trees thrown, so as to act as nuclei, and crystallization is allowed to take place. This salt, by re-solution, filtration, and crystallization, will afford a compound sufficiently pure for the use of the veterinary surgeon; indeed, the College of Physicians now directs the commercial salt to be merely purified.

Sulphate of iron is an astringent and tonic, the dose of which is from ℨij to ℨiv. The form for a second tonic mass of the College is as follows:

Tonic Mass.

Take of Sulphate of Iron, in powder	.	4 oz.
Ginger Root, ditto	. .	2 oz.
Common Mass	. . . . . .	10 oz.

Beat together, so as to form a mass. Dose from 8 to 12 drachms.

The constipated state of the bowels which sometimes follows the use of this compound should be guarded against by the occasional administration of a laxative.

Tests.—The purity of this salt may be judged of by its colour, which should be that of a bluish green. It is entirely soluble in water: and iron introduced into the solution does not precipitate any copper. The presence of the mixed salts of iron is known by their forming, with tannic acid, a black compound—

the tannate of iron; while the ferro-cyanide of potassium gives either a white or a blue precipitate; the former, if they are the protosalts; the latter, if the persalts.

Incompatibles.—The alkalies and their carbonates, which throw down the protoxide and the carbonate of iron; the nitrates of potassa, and silver, and also soap. Sulphate of iron is also decomposed by astringent vegetable bodies, a *tanno-gallate of iron* being formed; hence the propriety of the combination has been questioned, although some have supposed that the compound formed may produce all the desired action, and be even more readily taken up by the absorbents. If this were decided, we should be enabled to speak more definitely respecting the uses of the salts of iron in cattle practice. The sulphate of iron has, however, been given with benefit to cattle labouring under chronic diarrhœa, in doses of from ʒij to ʒiv, combining it with gentian and ginger.

FERRI SULPHURETUM, *Sulphuret of Iron.*

Iron and sulphur combine in several proportions. The above may be considered a protosulphuret, and is best made by taking a rod of iron, heating it to a white heat in a forge fire, and then rubbing it with a roll of sulphur, when the two elementary bodies will unite, and fall in the form of sulphuret, which is to be received in a vessel containing water, and when it

has become cold and solid, dried on bibulous paper. Or it may be made by heating up iron turnings to whiteness in a covered crucible, and throwing in about three fifths their weight of rolled sulphur, and then pouring the fused mixture into water.

Properties and Uses.—This compound has lately been advocated as an antidote against corrosive sublimate and arsenic. It is also used for obtaining sulphuretted hydrogen, so frequently employed as a re-agent, and which is generated by the addition of dilute sulphuric acid to it, when a protosulphate of iron remains in solution.

As compounds of the following metals are employed by the practitioner of veterinary medicine, the colour of the precipitate given by this re-agent, from their neutral solutions, may not be without value.

Antimony . . .	Orange-red
Arsenic . . .	Golden yellow
Copper	Brownish-black
Lead	Black
Mercury . . .	1. Dirty white; 2. Black
Silver	Black
Zinc	Dirty white.

Sulphuret of iron, and also the pulverised clinker of the blacksmith, have been occasionally resorted to as anthelmintics. The salts of iron have certainly much that recommends them to our notice as agents for

destroying parasites, since the existence of worms mostly depends upon a peculiar debilitated state of the system; and this being removed, the tissues cease to become a fit nidus for their development; while few substances can compare with the compounds of iron for restoring tonicity. Besides which, they act as poisons to all the tribe vermes. Yet it becomes a question, if a more definite and certain compound should not be preferred to either of those adverted to, such as the sulphate or the carbonate of iron.

The safer plan, however, appears to be, to precede the course of chalybeates by a brisk mercurial purge.

Test.—Its nearly perfect solubility in dilute sulphuric acid, giving off sulphuretted hydrogen.

FOMENTUM, *a Fomentation.*

The simplest and best fomentation consists of a piece of flannel dipped in hot water, quickly wrung out, and immediately applied to the inflamed part. And to prevent the escape of heat, another piece of dry flannel should be lightly thrown over it; nor should colour be altogether disregarded.

The value of fomentations is appreciated by most practitioners; but, in order to obtain the greatest good from them, they should not be occasionally, but continually employed; that is to say, the flannel should never be allowed to get cold, for then reaction

is set up in the vessels of the part. When judiciously applied they relax the capillary vessels, causing them to pour out a portion of their contents, thus they relieve the tension of the integument, and act almost as a local depletent, whilst the relief afforded is often communicated to deeper-seated parts. Their use is indicated during the formation of abscesses or of tumours, and after contusions and sprains. Many practitioners, finding their orders seldom attended to, namely, to keep the flannel always warm, have recourse to poultices in preference: but even here a watchful eye is requisite, for, if the poultice be allowed to get dry, much irritation will be created by it. The various herbs that were once recommended, are now, by common consent, discarded, as tending rather to check than to augment the benefit derivable from fomentations. In neuralgic affections, however, the addition of opium or belladonna may prove of service.

GALLÆ, *Galls, Gall-nuts, or Oak-galls.*

These are excrescences produced on the *quercus infectoria*—a species of oak found scattered throughout Asia Minor—by a small hymenopterous insect, which punctures the young bud with its ovaduct, and deposits its egg in the puncture. The derangement thus induced causes a gall to be thrown out, which constitutes its nidus, and in a day or two the

larva is hatched. The galls should be gathered before the change from the state of larva to that of the fly takes place, otherwise they are lighter and less astringent. The finest are imported from Aleppo and Smyrna.

Composition.—

Gallic Acid	6·2
Tannin	26·
Gum	2·4
Calcareous and other salts	2·4
Woody Fibre . . .	63·
	100

Properties and Uses.—Galls should be chosen imperforate, heavy, and of a bluish-grey colour. They are a powerful astringent, their activity depending upon the presence of tannic and gallic acids, and their *modus operandi* is probably referable to the change effected by these principles on the tissues: the gelatine becomes condensed, and hence a corrugation takes place, and a lessening of the caliber of the vessels of the part, by which secretion is checked. They may be readily pulverised, and given in doses of from ℥ij to ℥iv, both to the horse and cattle. For calves the quantity is from ℥ss to ℥j. On account of their being easily powdered, and from their containing more of the astringent principle, they are to be preferred to the bark of the oak (*cortex quercus*), which is recommended by many practitioners. Others give

the dried rind of the pomegranate (*cortex granati*); but this is far less active, on account of its containing, according to Sir H. Davy, not more than 18 per cent. of tannin.

Tannin, or Tannic Acid ($C_{18}H_8O_{12}=212$), is very powerful in its action, and has proved of service in those attacks of diarrhœa to which cattle and sheep are liable. It has also been given experimentally to dogs, in doses of from two to twelve grains. It caused in them the most obstinate constipation of the bowels, and one being destroyed in this state, the mucous surface of the intestines was found to be very dry. On examining it with a strong magnifying glass, the villosities and their pores were perceived to be considerably contracted, and the fæcal matter extremely hard.

It has been hence inferred that tannic acid acts chemically on the lining membrane of the intestines, in the same way as it operates upon the skin of animals after death, producing a degree of impermeability, and causing constipation by its constringing influence on the secreting tissues. Given in small doses, it is taken into the circulation, which is proved by its action on other mucous membranes; its effects being seen in cases of chronic catarrh, hæmoptysis, and hæmorrhages from surfaces. It is evidently a medicament possessing considerable power. Previous to its exhibition some laxative

agent should be administered, so that the sordes may be removed, which, by encoating, clog up the imbibing surface of the intestines. This remark will apply to medicines generally, but particularly in cases of spontaneous diarrhœa, which is often nothing more than the result of an effort of nature to dislodge some offending matter.

Not unfrequently the state of the fæces warrant the inference that some disordered function of the liver exists, and then a stimulant to that viscus is called for so as to restore healthy action: this we have in the compounds of mercury.

Incompatibles.—Metallic salts generally, especially those of iron; the mineral acids; the fixed alkalies and their carbonates; opium, and gelatinous substances.

Tests.—The sulphate of iron, which forms with it a black compound, the *tanno-gallate of iron.*

GENTIANA RADIX, *Gentian Root.*

The plant affording this medicinal root, or rather under-ground stem, is a perennial, a native of the Alps and mountainous parts of Germany; and is also found in North America. It appears not to yield roots of any value until it is four years old. Gentian is imported into this country from Germany in very large bags.

Composition.—The valuable qualities of this drug

are concentrated in a principal denominated *gentianine* by the continental chemists; besides which there are found gum, sugar, colouring matter, an evanescent odorous principle, fixed oil, a substance resembling bird ime, and woody fibre.

Properties and Uses.—The form of the root is cylindrical, varying in size and length; and those roots are to be preferred which are flexible and covered with a light-coloured wrinkled cuticle. When worm-eaten, they should be rejected. Gentian has an intensely bitter taste, but very little odour. Water and alcohol extract its virtues; a mixture of the two, or proof spirit, is therefore the best menstruum. An extract is made by boiling the root in water, straining the decoction, and evaporating until it is of a fit consistence. Should the powder be employed, the root must be carefully dried in an oven before it can be pulverised.

The dose of gentian is from ℨij to ℨiv; and of the extract, from ℨss to ℨj may be given twice a day. Its action is tonic, stomachic, and antiseptic. As a vegetable bitter, gentian is, perhaps, the best that can be employed in veterinary practice. In those states of the system when the stomach will not bear the mineral tonics, it may be advantageously given. There is likewise another advantage which it possesses —it is without that astringency which characterises many of the vegetable bitters, hence the salts of iron

do not cause any decomposition; and the good derived from the combination of bitters with chalybeates is well known. If any adjunct beyond this be called for, some carminative, such as ginger, may be added. In large doses it has been said to act gently as a laxative.

Gentian and chamomile flowers appear to include all the tonics of this class that need be used. It would, however, be easy to swell the list, and add cinchona bark, calumba root, quassia, and others. Cascarilla bark has been already spoken of.

For CATTLE and SHEEP, Mr. Youatt designates gentian as an excellent stomachic and tonic, superseding every other, whether at the close of illness or as a remedy for chronic debility. Its dose varies from one to four drachms, and it should be almost invariably combined with ginger.

Some practitioners prefer the form of tincture, than which I know none better than that given by the College of Physicians.

TINCTURA GENTIANÆ COMPOSITA, *Compound Tincture of Gentian.*

Take of	Gentian Root, sliced . .	2 ounces,
	Orange Peel dried . . .	1 ounce,
	Cardamom Seeds, bruised .	½ ounce,
	Proof Spirit	2 pints.

Macerate for fourteen days, and filter.

This is a powerful yet grateful bitter, and may be given to the horse and ox in doses of from ℥j to ℥ij, and to smaller animals in less quantities.

Helleborous Niger, *Black Hellebore.*

This plant, so named from the colour of its root, has found a place in our gardens, being cultivated for the sake of its flower, which appearing about Christmas, has received the name of the Christmas rose. It is, however, a native of Austria, and of Italy, and grows wild on the Apennines.

The root, which is perennial, consists of a short thick stump, sending off many small round fibres, about the thickness of a straw, which on drying become corrugated. Externally they are of a brownish black colour; internally of a yellowish white.

Composition.—According to Feneulle and Capron, a volatile oil; concrete oil, resembling fat; resin, wax, volatile acid, bitter principle, mucus, alumina, gallate of potass and lime, and a salt with an ammoniacal base.

Properties and Uses.—In veterinary medicine black hellebore root is used only as a local applicant, its action being that of a powerful stimulant and digestive.

For a knowledge of its usefulness to the horse I am indebted to Mr. E. Stanley, who employs it in

fistulous affections of the poll and withers, and, as he informs me, with almost uniform success. His course of procedure is this:—the abscess having formed, and exit being given to the imprisoned fluid, it is allowed to discharge itself for two or three days, being dressed merely with an ordinary digestive. When the pus assumes a laudable character, he introduces a few portions of the fibrous part of the root, passing them down to the bottom of the cavity, and letting them remain there for a fortnight or more; in the meantime merely keeping the surrounding parts clean. On examination it will be found that the healing process has commenced where it is desirable that it should, and a fresh introduction of more of the root is called for: this is repeated until a cure is effected. Having seen its action in several cases, I can speak somewhat confidently of its power. All that is requisite is to guard against employing it too early, since death has been the result of the great excitement which it has produced in the system, when introduced in any quantity into a part.

An ointment formed by the powder of this root, or that of white hellebore, in the proportion of one part to eight of lard, will be found extremely useful for the dressing of rowels or setons, in those cases where the compounds of turpentine and cantharides are inadmissible.

For Cattle, black hellebore has been for a long

time employed, it being inserted as a seton in the dew-lap. Some practitioners make use of the leaves, but the fresh root is by far the most active. It quickly produces much swelling, which is followed by suppuration.

In some parts of Germany it is used in a similar way for DOGS labouring under distemper. Vomition is caused by it, and relief is thus afforded.

The following formula for an active digestive ointment for CATTLE has been communicated to me by Mr. G. J. Sparrow, who speaks highly of its effects:

UNGUENTUM HELLEBORI NIGRI, *Ointment of Black Hellebore.*

Take of Leaves of Black Hellebore,
Hogs' Lard, of each equal parts.

Boil together till the former are crisp; strain off, and add common turpentine equal in weight to the ointment obtained. Mix.

HYDRARGYRUM, *Mercury or Quicksilver.*

This metal is found native, but not in large quantities, it being merely disseminated in small globules amongst the ores of mercury; the most abundant of which is the bi-sulphuret, from which the mercury of commerce is obtained. This mineral occurs

massive, in granular concretions, and also crystallized, of a red colour, varying in its shades. It is denominated cinnabar. The most productive mines are those of Idria in Carniola, the lower Palatinate, Almaden near Cordova in Spain, and Guanan Cavelica in Peru, where the sulphuret exists in an enormous mass fifty yards in width, and it has been worked to the depth of 500 yards. Other mines exist in Germany, Hungary, and New Spain, also in China and California.

The method by which the metal is obtained from the native bi-sulphuret is this:—The ore being broken into pieces and sorted, is reduced to powder, and mixed with one fourth of its weight of quick-lime. This is placed in iron retorts, each of which holds about half a hundred-weight. Many of these are arranged in a furnace together, and glass receivers are fitted to them. Heat being applied, some watery vapour is first disengaged. This is allowed to escape, and the receivers are then luted on, when the mercury passes over and is condensed in them: the sulphur, in the meantime, combines with the lime, forming a sulphuret of lime which remains in the retort. Instead of lime, iron filings are sometimes employed. By this process one hundred pounds of the ore yield from six to ten ounces of mercury; and it is that usually adopted in Germany, whence the market is largely supplied. Mercury is generally

imported in cast-iron bottles, containing from sixty to a hundred pounds weight.

This metal has the singular property of being fluid at the ordinary temperature of our atmosphere; it is also volatile, but at about 40° below 0 Fah. it becómes solid, and at 660° Fah. it boils rapidly, and may be distilled like water. It is inodorous, insipid, and of a bright white or silver colour. Its specific gravity is 13·568; and its atomic weight has been given as 200. Chemists seem now inclined to view it as 100. This change has arisen from the salts of the red oxide being the more stable and permanent; hence this has been thought to be the true protoxide, instead of the grey oxide, which was previously considered as such. Professor Brande says, "The instability of the grey oxide, and the stability, and highly basic characters, which even approach alcalinity of the *red* oxide, are among my reasons for thinking this change necessary, although it is inconvenient." The adoption of this view by the College of Physicians would have made the present chloride of mercury a *sub-chloride*, and the bichloride a *chloride;* but this not having been done by them, the only change, according to Phillips, being the reduction of the weight of the atom from 202 to 200: therefore in the decompositions which follow, I have not altered the atomic numbers, only so far as this. The above remarks on the

chlorides of mercury will also apply to the iodides, sulphurets, &c.

When pure, mercury is extremely mobile, and if thrown upon a level surface in small portions, it readily divides into minute round globules. This is one test of its purity, for it is frequently adulterated by an admixture of other metals, particularly lead, tin, zinc, and bismuth. When this is the case, it not only loses its mobility and bright metallic appearance, but, when divided, the globules have an irregular form, being what is termed *tailed;* and when exposed to the air, a film collects on its surface. It likewise tarnishes the glass bottles in which it is kept. The means of purification are by distillation with iron filings, or by agitation in dilute sulphuric acid.

In its metallic state mercury appears to have no action on the animal system. Its compounds, however, are very energetic, being general and powerful excitants to glandular structures, and a few of them are caustics. Those employed in veterinary practice are the *oxide* and the *nitrate* in the form of ointment, the *proto* and *perchloride* of mercury and the *biniodide.* The *sulphuret* was at one time extolled as an alterative, but it is now considered a very inefficient compound.

HYDRARGYRI BICHLORIDUM. *Bichloride of Mercury.* (Chloride of Mercury, according to the new view of the atomic constitution of this salt $H_g.Cl. = 136.$) Old Names: Corrosive Sublimate, Oxymuriate of Mercury, Muriate of Mercury, &c.

To prepare this compound, the College of Physicians thus directs:

Take of Purified Mercury, by weight,			2 pounds,
	Sulphuric Acid,	do.	$21\frac{1}{2}$ fluid oz.,
	Chloride of Sodium . . .		$1\frac{1}{2}$ pound.

Boil the mercury with the sulphuric acid in a glass vessel, until the bipersulphate of mercury becomes dry; rub this, when cold, with the salt in an earthen mortar, and sublime with a heat gradually raised.

Decomposition.—At a low temperature no change is effected by sulphuric acid on the mercury, but at the boiling point a portion of the acid becomes decomposed, and is resolved into oxygen, which converts the metal into an oxide, and sulphurous acid gas, which is liberated with effervescence. The remaining undecomposed acid now acts upon the oxide, and forms it into a bisulphate of the peroxide of mercury; common salt being added to this, and heat applied, the chlorine of the salt goes to the mercury, changing it into a bichloride, which sublimes; while the oxygen of the oxide of mercury, uniting with the sodium,

forms soda; and this combining with the sulphuric acid, forms a sulphate of soda, which remains at the bottom of the subliming vessel.

The following diagrams will simplify this explanation, remembering that four equivalents of acid are employed with one of mercury and two of the chloride of sodium:

To form the Bipersulphate of Mercury.

Materials.			*Products.*
40 Sulph. Acid	Sulphurous Acid	32	32 Sulphurous Acid Gas
	Oxygen	8	
40 Sulph. Acid	Sulphurous Acid	32	32 Sulphurous Acid Gas
	Oxygen	8	
40 Sulph. Acid		40	
40 Sulph. Acid		40	
200 Mercury		200	296 Bipersulph. of Merc.

To form the Bichloride of Mercury.

Materials.			*Products.*
296 Bipersulphate of Mercury	Mercury	200	272 Bichloride of Mercury
	Oxygen	8	
	Sulph. Acid	40	
	Oxygen	8	
	Sulph. Acid	40	
120 Chloride of Sodium 2 equiv.	Chlorine	36	
	Chlorine	36	
	Sodium	24	72 Sulphate of Soda
	Sodium	24	72 Sulphate of Soda.

Composition.—1 atom Mercury 200
2 atoms Chlorine . $36 \times 2 = 72$

Equivalent 272

When the red oxide is considered as basic, it is then only a sulphate of mercury first formed, which being decomposed by common salt, the following diagram will explain the change:

148 Sulphate of Mercury	Mercury	. 100	136 Corrosive Sublimate
	Oxygen	. 8	
	Sulph. Acid	. 40	
60 Common Salt	Chlorine	. 36	
	Sodium	. 24	72 Sulphate of Soda.

Bichloride of mercury usually occurs in masses made up of small acicular crystals. If, however, care is taken in its preparation, these are larger, and in form tetrahedronal. They effloresce on the surface by exposure to the air. Their specific gravity is 5·1398; taste disagreeable and metallic. Soluble in twenty parts of water at 60°, and in about three parts at 212°. This solubility is increased by the addition of hydrochloric acid, hydrochlorate of ammonia, or common salt.

Properties and Uses.—Internally the bichloride of mercury is rarely ever administered. It is advocated by some persons as an alterative and tonic in farcy, being given in doses of from 5 to 10 grains daily,

until the mouth is affected by it. Of its effects, however, I cannot speak from observation. Externally applied, it is an active caustic, and is much extolled by the older practitioners for causing an extensive slough; hence it is used by them in sinuous wounds, and wherever it is desirable to expose a new surface. The form is either that of solution, or it is introduced into the fistula in small cones made of paper, when it soon dissolves, and by its action creates much surrounding irritation. This Institution long possessed a formula for a solution of it to be thus made:

Liquor Hydrargyri Bichloridi. *Solution of Bichloride of Mercury.*

Take of	Bichloride of Mercury . . .	1 part,
	Hydrochloric Acid	1 part,
	Rectified Spirit of Wine or Water	7 parts.

Dissolve.

This was injected into fistulous sores; but of late years it had been discarded, and milder remedies are employed with greater success. A similar solution has been used as a topical application to farcy ulcers with benefit.

In the use of the bichloride of mercury in the solid state as a caustic, there is not that to be apprehended which sometimes follows arsenious acid, namely, its absorption and secondary effects upon the system;

because the albumen of the tissues decomposes it, and an insoluble compound is thus formed; besides which, from its powerful action, it almost instantaneously destroys the absorbent vessels.

When, however, it is in a state of solution, we may have reason to apprehend that serious consequences will follow its incautious use, because the absorbents may then carry it into the general circulation. The best way, therefore, to employ it as a caustic is in the state of fine powder, which may be lightly sprinkled over the part we wish to cause the destruction of.

A paste made of 1 part Bichloride of Mercury and 2 parts of Lard, spread on leather, has been resorted to for the removal of bony tumours; and in the proportions of 1 to 8, it has been used for the caustic clams employed for the castration of animals, but Mr. Varnell's simple and ingenious clams supersede the employment of these and all similar compounds.

The late Mr. C. Dawson recommended a solution of this salt for the purpose of coagulating the synovia as it escapes from open joints; and his account of its action, in the pages of "The Veterinarian," is highly favourable.

A solution of the bichloride of mercury, in the proportion of five to ten grains to four ounces of water, the salt being first rubbed down with a few drops of spirit of wine, is an effective application for the mange in dogs, and also to destroy lice; but the

animal should be prevented from licking himself for some time afterwards, or it may be the means of setting up irritation of the bowels. At this degree of strength it is likewise a most valuable lotion for mange in cattle; but many a beast has been destroyed when more of the mercurial compound than this has been used.

Incompatibles.—The internal use of the bichloride of mercury not being advocated at the College for the horse, and being also condemned for cattle, I need not name them. I would merely observe that, in cases of an over-dose of this agent having been administered, counteragents must be promptly resorted to. As an antidote, the white of eggs should be liberally given, suspended in water, or gluten obtained from wheat flour, or milk, or iron filings.

The protosulphuret of iron has also been lately recommended as an antidote. It may be extemporaneously made by adding to a solution of the sulphate of iron a solution of the hydrosulphuret of ammonia, until no further precipitation takes place. This precipitate is to be collected on a filter, and, being washed for use, it is to be administered in the moist state.

The decomposition that takes place on the administration of this antidote is very simple: the chlorine goes to the iron, while the sulphur attacks

the mercury; and thus two comparatively inert compounds are formed in the stomach.

Orfila concurs in the views taken, that the proto-sulphuret of iron most effectually decomposes the bichloride of mercury; but remarks, that it requires to be given immediately after the exhibition of the poison, that is, within ten or fifteen minutes, otherwise it is inefficacious.

A beautiful application of a scientific principle has been likewise suggested,—that of giving gold and iron in combination as an antidote. It has been found that two grains of gold dust and two of iron are sufficient to decompose five grains of corrosive sublimate, and this so perfectly, that no trace of it can be detected by the most delicate tests. This method likewise applies to all the other soluble compounds of mercury.

The simplest way of reducing the metals to powder is by filing, and they should be administered suspended in mucilage of gum arabic. I am quite aware that such a means as this would not be adopted by the practitioner of veterinary medicine, and it is merely mentioned by me as a proof of the progress of science.

Tests.—Its purity is known by its being sublimed by heat, leaving no residuum; also by its solubility in water, alcohol, and sulphuric ether.

Lime-water added to its solution gives either a

lemon-yellow precipitate—the *hydrated binoxide*, or a brick-dust red one—the *oxychloride*.

The *alkaline carbonates* also throw down the like compounds.

Iodide of potassium occasions a yellow, turning to a scarlet precipitate—the *biniodide of mercury*.

Albumen is generally given as a test for it, but it is not one that can be relied on, although it forms a valuable antidote. The nature of the precipitate has not been clearly ascertained. Some contend that a protochloride of mercury and a chloride of albumen are formed; others, that it is a definite and insoluble compound of albumen and the bichloride of mercury.

Hydrosulphuric acid, if in excess, affords a black precipitate—the *bisulphuret of mercury;* if not in excess, a white precipitate—the *chlorosulphuret of mercury*.

Protochloride of tin gives a white precipitate—the *protochloride of mercury*, and perchloride of tin remains in solution. Very soon, however, the protochloride is converted into reguline mercury, which falls down in the form of a greyish powder.

Galvanism is another test. It is effected by placing a drop of the suspected solution on a piece of gold, as a sovereign, and bringing a small arc of iron, as a key, into contact simultaneously with both the gold and the solution: an electric current is immediately

produced, which decomposing the bichloride of mercury, the chlorine unites with the iron, while the mercury combines with the gold.

The most delicate of these tests are the two last named. To them may be added that of *reduction*:—Heat in a glass tube, by means of a spirit lamp, some of the suspected powder mixed with caustic potash, when oxygen will be evolved, chloride of potassium formed, and the metal mercury, being sublimed, will be condensed on the sides of the tube.

As a reducing agent, several of the metals may also be employed. Among these silver and iron rank first. For this purpose the metal, in the state of fine filings, should be used, and, the suspected powder being heated with them in a tube of hard glass, mercurial globules will sublime. When the quantity is very small, after ignition the metallic globules may be detected by means of a lens, the chloride of iron formed being removed by hydrochloric or sulphuric acid.

HYDRARGYRI CHLORIDUM, *Chloride or Protochloride of Mercury*. (Subchloride of Mercury according to the new view of the atomic constitution of this salt $H_{g2.}$ Cl. = 236.) Old names: Calomel, Submuriate of Mercury, &c.

The College of Physicians directs it to be made thus:

Take of Purified Mercury, by weight 4 pounds
Sulphuric Acid, by weight . $21\frac{1}{2}$ fl. ounces,
Chloride of Sodium . . . $1\frac{1}{2}$ pound.
Distilled Water, as much as may be sufficient.

Boil two pounds of the mercury with the sulphuric acid in a glass vessel until the bipersulphate of mercury is dry. When this is cold, triturate it with the remaining two pounds of mercury in an earthen mortar, so that they may be thoroughly mixed; then add the chloride of sodium, and rub them together until globules of mercury are no longer visible; afterwards sublime. Reduce the sublimed matter to a very fine powder; wash it carefully with boiling distilled water and dry it.

Decomposition.—By boiling mercury in sulphuric acid in excess, a portion of the latter becomes decomposed, being resolved into sulphurous acid, which escapes in a gaseous form, and oxygen, which combines with the metal, converting it into an oxide: this is dissolved by the undecomposed acid, and formed into one equivalent of the bipersulphate of mercury, since four proportionals of acid are employed to one of mercury. On the addition of the remainder of the mercury, this is changed into two equivalents of the protosulphate, by the abstraction of one equivalent of oxygen and one of sulphuric acid by the atom of mercury added. When these

are sublimed with the chloride of sodium, a double decomposition takes place; the oxygen of the sulphate of mercury combines with the sodium, forming soda, which the sulphuric acid converts into sulphate of soda, and this remains at the bottom of the subliming vessel; while the liberated chlorine unites with the vaporized mercury, and these, rising together into the head of the vessel, are condensed, constituting the protochloride of mercury. This being a crystalline compound, it is directed to be pulverized, and subsequently washed.

Mr. Jewell invented a process which has been improved by Mr. O. Henry, by which this compound is obtained in the state of an impalpable powder. It essentially consists in keeping the receiving vessel filled with steam, in which the calomel, as it passes over in a state of vapour, is at once condensed.

Soubeiran, however, says the following method is much better than that with steam, being considerably easier to execute, and equally efficacious as regards the beauty of the preparation. The calomel is heated in an earthen tube in a furnace, and a current of air is directed uninterruptedly into the tube by means of a small ventilator. This sweeps away, as it were, the vapours of calomel, and in a straight tube it will carry them a distance of sixty feet, to avoid which the end of the recipient enters into water, by which the calomel is moistened and falls down.

Righini has likewise found that, by the long-continued action of steam upon finely-powdered calomel, a small portion of corrosive sublimate is formed.

The subjoined diagrams will render these changes more easily understood.

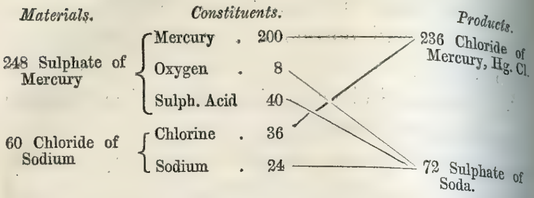
To prepare the bipersulphate of mercury, the diagram under the head of bichloride of mercury will suffice. (See p. 263.)

To form the Sulphate of Mercury.

Materials.	*Constituents.*		*Products.*
296 Bipersulphate of Mercury	Sulph. Acid	40	248 Sulphate of Mercury
	Oxygen	8	
	Mercury	200	
	Oxygen	8	
	Sulph. Acid	40	
200 Metallic Mercury		200	248 Sulphate of Mercury.

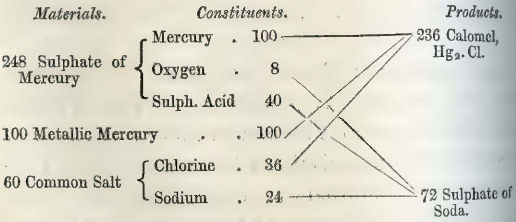
Two equivalents of common salt are now added to these two equivalents of sulphate of mercury, and heat applied, when two equivalents of chloride of mercury and two equivalents of sulphate of soda are formed by the mutual interchange of the constituents. It will, however, be only requisite to consider one equivalent of each as undergoing change; thus:

To form the Chloride of Mercury.



Composition.—1 atom	Mercury	. .	200
1 ,,	Chlorine	. .	36
Equivalent		. . . .	236

If calomel, however, be viewed as a subchloride, from the red oxide being accepted as the *basic* oxide, then the following diagram becomes explanatory of the changes that occur in the latter part of the process :



Properties and Uses.—Protochloride of mercury, or calomel, occurs in the shops in the form of an impalpable powder, of an ivory-white colour, which

darkens by exposure to the air. It is inodorous, insipid, and nearly insoluble in water.

It may be regarded as one of the most useful of the preparations of mercury; and being a general excitant to glandular structures, it is therefore often given in combination with various other therapeutics. The dose may be from ʒss to ʒij. As a purgative, and administered to the horse alone, it is an unsafe one; for when increased action of the bowels is produced by it, this is often very violent, the dejections becoming profuse and extremely offensive, while the most prompt measures are called for to restrain its operation. It is valuable, however, as an adjunct to other cathartics. Combined with opium, it has been found of service in enteritis and dysentery, by promoting a return of the natural functions of the alimentary canal, while its violent effects are guarded against by the opium, which at the same time allays the pain and irritation. It is often resorted to at the College in order to effect an expulsion of worms from the intestinal canal, being given in doses of from ʒj to ʒij over night, and on the following morning an aloetic purge is administered. By this means large quantities of them are often expelled. There are numerous recipes for the expulsion of these parasites, the vegetable and mineral kingdoms having been ransacked for vermifuge agents; but it has been very aptly remarked by Mr. B. Clark, that

"although we can force poison down the horse's throat, we cannot force the worms to receive it."

Some practitioners advocate the employment of granulated tin, others powdered glass, and the down of the *dolichos pruriens,* all of which may be viewed as acting merely mechanically. Again, others give savin and tobacco, and from these agents, when judgment has not been exercised in their administration, serious consequences have resulted. Mr. J. Western, of the Madras Horse Artillery, says that he has used for many years, with perfect success, the seeds of the *Butea Frondosa,* a tree growing in India, the juice of which, when evaporated, becomes a hard astringent substance, known in commerce as East Indian Kino. The lac insects also are found on the smaller branches and leaf-stalks of this tree. The seeds are thin and flat, kidney-shaped, and covered externally with a red epidermis; breaking with a starchy fracture, and having a slightly astringent taste, with a pea-like flavour. Their watery infusion, which is of a pink colour, becomes of a deep green on the addition of a persalt of iron, showing the principle in it to be allied to, if not identical with *catechin.*

Mr. Western gives two drachms of the powdered seeds, made into a soft ball, for three consecutive mornings, and on the fourth he combines with the same quantity a purgative agent.

Mr. T. Hagger informed me that he was in the

habit of resorting to the betel nut, the seed of the *areca catechu*, for the same purpose. Whenever indications of the existence of parasites were perceived, such as a staring coat, loss of appetite, and impaired condition, his plan was to withold half the usual dose of aloes, and substitute for it one or two drachms of the betel nuts in powder. For worms in the dog he found them equally efficacious, and he further states that the natives invariably use them as anthelmintics. To Mr. Western I am indebted for specimens of the flowers and seeds of this plant. Probably the beneficial effects of both of these agents may be referred to their astringent tonic action; for by increased tone and vigour being given to the tissues, worms no longer find them a favorable habitat. In the same way, the simple vegetable bitters, as wormwood, rue, and quassia, have been found to act, by inducing a healthy state of the digestive organs, and not by their being offensive to worms, as was once thought. Kosso, or *brayera anthelmintica*, the the flowers of a tree growing in Abyssinia, and used there for destroying worms for more than two centuries, has been tried with questionable results for *tænia*. Its action is that of a purgative, although analysis gives the presence of tannic acid, to which its toxic influence on the worm has been attributed. Possibly its expensiveness will preclude its general use for the horse; to which must be added the

infrequency of this parasite in him; the *lumbrici* and *ascarides* being far more commonly met with; and for the latter, oleaginous purges and enemata will prove the most effective agents for their removal.

In hepatic affections, calomel has been found of the greatest service. In repeated small doses it will produce ptyalism, an effect which I have witnessed several times. Professor Spooner informs me that he has employed with benefit the protoxide in combination with the chloride of calcium in solution, constituting "black wash," for sluggish and ill-conditioned ulcers. This is readily made by adding two or more drachms of calomel to a pint of lime-water. If a more active compound is required, the bichloride of mercury may be substituted for the chloride, forming the *hydrated binoxide*, or "yellow wash."

For CATTLE and SHEEP its use is generally objected to, except in cases of obstinate dysentery. Its influence on the DOG has been elsewhere spoken of. (See p. 105.)

Tests.—Its purity is known by its entire volatilisation by heat, by its insolubility, and by the water in which it may have been either washed or boiled affording no precipitate with the nitrate of silver, lime-water, or hydrosulphuric acid, which it would do were any bichloride of mercury present. On the

addition of potassa it blackens, and, heat being applied, globules of metallic mercury are obtained.

Incompatibles.—Calomel is decomposed by the alkalies and their carbonates, lime-water, and the soaps, which throw down the *protoxide of mercury.* Also by iron, lead, and copper, and the hydrosulphurets of these metals. Hence, in dispensing it, metallic mortars should not be employed.

Hydrargyri Biniodidum, *Biniodide of Mercury.*
(Iodide of Mercury if viewed as $H_g.$ I. = 226.)

Take of Mercury . . . . 1 ounce,
Iodine . . . . 10 drachms.
Rectified Spirit as much as may be sufficient.

Rub the mercury and iodine together, adding the spirit gradually so as to keep the mixture moist and thus prevent explosion, until globules are no longer visible. Dry the powder with a gentle heat, and keep it in a well-stoppered bottle.

Another method of preparing this compound consists in adding a solution of the iodide of potassium to that of the bichloride of mercury so long as any precipitate is thrown down. The proportions are about 10 of the former to 8 of the latter, and the compound formed is of a brighter colour, owing to the presence of a little water. After being mixed, double decomposition takes place, the biniodide of

mercury is precipitated, and a chloride of potassium remains in solution.

In the first form, simple union takes place between the elementary substances, the dilute alcohol merely facilitating the combination by dissolving the iodine.

Composition.—1 atom Mercury		. .	= 200
2 atoms Iodine		126×2	= 252
Equivalent		. . .	452

Properties and Uses.—Biniodide of mercury occurs in the form of powder, of a red colour, approaching to scarlet, whose specific gravity is 6·32. It fuses readily, and sublimes, forming yellow-rhombic scales, which become red when cold, or on being rubbed. It is insoluble in water, but soluble in alcohol when heated, some of the acids and alkalies, also a solution of the iodide of potassium, and of common salt, when saturated, at 212°, from which it is again precipitated on cooling. This distinguishes it from the iodide.

The attention of the profession in this country was first directed to this compound by Mr. Hugh Ferguson, who was soon after followed by Mr. Wills, in a paper read at the Veterinary Medical Association. In France it appears long to have held a place in the estimation of veterinary surgeons, principally, however, as a topical application in the form of ointment, made as follows :

UNGUENTUM HYDRARGYRI BINIODIDI, *Ointment of the Biniodide of Mercury.*

Take of	Biniodide of Mercury . . .	1 part,
	Lard	8 parts.

Intimately mix.

This, applied to sores, is a stimulant and detergent, and as such it may be employed when they have taken on an unhealthy action. But its more general use is as a counter-irritant to the skin, which it powerfully excites, sometimes inducing intense erysipelatous inflammation, accompanied with much pain, and followed by desquamation of the cuticle. By it absorption is also very much facilitated; and hence it has been found of service in splents, curbs, incipient spavins, enlarged bursæ, thickening of the integument, indurated tumours, and abnormal growths. In some cases, from the susceptibility of the skin to be irritated by it, the quantity of the biniodide requires to be lessened to one-half. The application of the ointment should be accompanied with friction; and when soreness has been induced by it, and a vesicular eruption appears, its use should be abstained from for a time; but as soon as these effects have passed off, it may be again and again applied.

Internally, the effects of the biniodide of mercury are analogous to those produced by the bichloride of

mercury; but I am not aware that it possesses any peculiarity of action to recommend it.

Tests.—Heated with potassa in a tube, it yields metallic mercury. It sublimes by heat in scales, which soon become yellow, and, as they cool, red. It is totally soluble in a solution of chloride of sodium, and is alternately dissolved and precipitated by iodide of potassium and bichloride of mercury.

It has been sometimes commixed with the bisulphuret of mercury. This, according to Pereira, may be recognised by fusion with caustic potassa in a glass tube, when a mixture of sulphuret and iodide of potassium is obtained. The existence of sulphur may also be proved by the evolution of hydrosulphuric acid on the addition of a mineral acid.

HYDRARGYRUM CUM CRETA, *Mercury with Chalk.*

Take of Purified Mercury, by weight	. .	3 parts,
Prepared Chalk	. . . .	5 parts.

Rub them together until globules of mercury are no longer visible.

Properties and Uses.—By triturating mercury and chalk together, a very small portion of the metal becomes oxidized, and the remainder is finely subdivided; the whole forming a grey impalpable powder. Its activity as a medicinal agent has been much questioned by writers. Professor Simonds,

however, advocates its use in the dog as an alterative, in doses of from 5 to 10 grains. It is, doubtlessly, a very mild remedy, and on that account not resorted to for the horse. The following compound will, probably, be found more useful for the last-named animal:

PILULÆ HYDRARGYRI CUM FERRI, *Mercurial Pills with Iron. Ferruginated Blue Pill.*

Take of	Purified Mercury	2 parts,
	Sesquioxide of Iron . . .	1 part,
	Confection of Roses	3 parts.

Rub the whole together until the globules of mercury are no longer visible.

Properties and Uses.—I have adopted this form of blue pill on the authority of Dr. Collier, who says "it may be made in five minutes; the metallic globules at the end of that period not being visible even by a microscope, and it is uniform in its appearance and effects. The presence of iron also prevents the wear and tear of the system, the powers of life not being prostrated at all under its use; and its resolvent powers are greater than those of mercury alone."

It may be given to the horse as an alterative in doses of from ʒss to ʒj, combining it, when we apprehend it will act on the bowels, with opium.

UNGUENTUM HYDRARGYRI, *Mercurial Ointment.*

Take of Purified Mercury,
Prepared Lard, of each equal parts.

Let the mercury be rubbed with a portion of the lard till its globules become extinct; then add the remainder, and intimately combine them.

This compound should always be made under the superintendence of the practitioner, although it calls for labour and patience. As ordinarily prepared, it seems that a small portion of the metal becomes oxidized during trituration, and the remainder is minutely subdivided, which will again run together into globules if heat be applied. To facilitate the disappearance of the metallic mercury, various substances are employed; the best is rancid lard, or tallow, or some mercurial ointment that has been long kept.

The French pharmaciens have ascertained that, if lard be first melted, then poured in a very fine stream into a vessel containing a quantity of cold water, and afterwards placed in this divided state on a coarse hair-sieve and exposed to the action of a dry atmosphere, it will acquire such properties as quickly to extinguish the globules of mercury: it being capable of so acting on thirty times its weight of that metal. This power, however, will in a great

measure depend upon the length of time it is exposed to the air.

The tallow of Kensington mould-candles has been found equally efficacious, and it is said that large quantities have been sold as *prepared stearine* for this purpose.

As it appears desirable that the whole of the mercury should be oxidized, it has been proposed to combine the oxide of mercury with the lard by simple mixture. This plan, however, has not come into general use, although the compound thus formed has been found quite equal to the officinal preparation. The addition of sulphuretted oil or turpentine, by which the oxidation of the mercury has been thought to be more quickly brought about, is objectionable. I am quite aware that the conditional state of the mercury is a disputed question; but experiments lately instituted by M. Berensprung, have shown that the activity of mercurial ointment depends on the presence of the black or grey oxide of mercury, and Drs. Christison and Paris also consider some of this oxide to be present, and recommend an ointment to be made with it.

Mercurial ointment is occasionally employed in skin affections, as tetter or ringworm; and also for mange in the horse. For these diseases it should be diluted as follows, and its action carefully watched, since I have more than once seen salivation produced

by its incautious use, and even dysentery and death. In the hands of the scientific man, however, there is nothing injurious to be apprehended from its employment.

UNGUENTUM HYDRARGYRI COMPOSITUM,
Compound Mercurial Ointment.

Take of Mercurial Ointment	.	1 part,
Soft Soap	. . . . .	2 parts.

Mix them.

Mercurial compounds are frequently had recourse to for the extirpation of those parasites which infest the skin of our domesticated animals.

It seems now to be the general opinion, that itch in the human subject, and mange in the horse and cattle, are diseases produced by a species of *acarus* or mite. This insect is seldom found on the outer skin, but, commonly, between the cutis and the cuticle, where it makes thread-like passages in various directions, which terminate in pustules or little bladders. Here, probably, the insect takes up its residence until it is dislodged. Some naturalists, however, assert that it is met with only in the passages; but, from the nearness of the one to the other, a mistake may easily be made.

Whether this is the only cause of mange, I will not take upon myself to decide; but that this

parasite has been found in the pustules of mangy subjects is indubitable. There are many cutaneous affections which have their origin from a very different cause; as, for instance, a scurfy eruption of the skin often follows *surfeit,* a disease induced by a disordered state of the digestive organs; and besides which, we have many forms of impetigo and herpes. Possibly the attention of veterinarians has not yet been sufficiently directed to the diseases of the envelope of the body; the time, I trust, is not far distant when this opprobium will no longer exist.

Mr. Youatt was decidedly of opinion that the *acari* are the cause of scab in sheep, a malady which is well known to produce direful ravages in a flock, and to be propagated very readily by contact. Mange in cattle he also ranks as one of the most serious of the diseases of the skin. Fortunately, the treatment is simple and effectual. Of course, the sole object is the extirpation or removal of these tormentors. According to him, the judicious use of mild mercurial ointment blended with sulphur, seldom fails of effecting a cure.

For Sheep, he advocates one part of mercurial ointment and five parts of lard mixed together. The quantity applied to each sheep will vary from a few drachms to two ounces. One third of these quantities should be used for a lamb. Some prefer the combination of soft soap with the mercurial oint-

ment, rendering it semi-fluid by means of water, and then, having carefully parted the wool, applying it from a bottle having a short neck. Others use a solution of the arsenite of potassa, as given at page 55.

For CATTLE, the following compound is recommended by Mr. Youatt:

Take of	Sublimed Sulphur .	1 pound,
	Common Turpentine .	4 ounces,
	Mercurial Ointment .	2 ounces,
	Linseed Oil . . .	1 pint.

The turpentine and the oil are to be melted together, and, when nearly cold, the sulphur is to be stirred in, and after this the mercurial ointment is to be intimately blended with the whole. He deprecates the use of solutions of arsenic and corrosive sublimate, which are so often had recourse to, as well as decoctions of hellebore root and tobacco, which, he says, have destroyed thousands of cattle.

For the DOG, the inunction of mercurial compounds requires caution, and should be carefully watched, lest salivation be produced by them. Mange in this animal appears to assume a variety of forms, and often proves very obstinate to cure. See "Blaine's Canine Pathology," article *Mange*. Sulphur ranks among the best remedies. In the College, however, of late the iodide of sulphur, and the sulphuret of potassium, have been used with decided success.

UNGUENTUM HYDRARGYRI NITRATIS, *Ointment of the Nitrate of Mercury.*

Take of	Purified Mercury . .	1 part,
	Nitric Acid	2 parts,
	Poppy Oil	8 parts,
	Prepared Lard . . .	2 parts.

Dissolve the mercury in the acid, carefully avoiding the fumes that are given off, and, while hot, pour the solution into the lard and oil, previously melted together. Stir constantly until cold with a wooden spatula.

Decomposition.—A portion of the nitric acid become decomposed; nitrous acid fumes are evolved, and the oxygen oxidizes the metal, which oxide is dissolved by the remaining undecomposed acid, thus forming a nitrate.

When carefully prepared, and according to the directions of the College of Physicians, this ointment is of a pale and delicate yellow colour, hence called *citrine ointment* by the French: but it is very apt to get hard and brittle, arising from the action of the acid on the fatty matters; to obviate which it has been proposed to form a nitrate of mercury first, and then mechanically combine it with lard and oil. But an excess of acid appears to be advantageous in veterinary practice, the compound being used as a detergent and stimulant to certain diseases of the skin,

such as chronic grease, ringworm, and those affections vulgarly called mallenders and sallenders, names which, long ere this, should have been buried in oblivion. I have substituted poppy oil for that of olives, and find that, although the colour of the compound is not so delicate, its consistence is both much improved and retained for a longer time.

A milder form of this ointment has been found of service in tarsal ophthalmia, being applied with a camel's-hair pencil, and two or three grains of it placed under the eye-lid have assisted in the removal of nebulæ from the cornea. It is best made extemporaneously, by mixing together one part of the stronger ointment with two parts of lard and oil. A *liniment* of the nitrate of mercury may be formed by adding the solution of the nitrate of mercury to poppy oil alone, and triturating them together until they incorporate.

Besides these compounds of mercury, there are two others occasionally resorted to, which I shall only briefly notice. They are commonly called the *red* and *white precipitates*.

The first of these is designated, by the College of Physicians, the NITRIC OXIDE OF MERCURY. It is obtained by dissolving the metal mercury in dilute nitric acid, and evaporating to dryness. It may be also procured by subjecting mercury to the action of heat in a flat-bottomed flask having a long neck, or

by adding caustic potassa in excess to a solution of corrosive sublimate.

Properties and Uses.—This oxide is considered by chemists as the basic oxide, although not adopted as such by the framers of our national pharmacopœia. Its composition, according to them, is

1 atom Mercury . . .	200
2 atoms Oxygen . $8 \times 2 =$	16
Equivalent . .	216

It occurs in shining red scales, and is sublimed by a strong heat, evolving no red fumes. It is also soluble in hydrochloric and nitric acids.

Its use is that of an escharotic when sprinkled over wounds.

An ointment, made by incorporating one part of this oxide of mercury finely powdered, with eight parts of lard, has been used by some practitioners as a detergent and stimulant.

Red precipitate is sometimes adulterated with red lead, or ochre, or brick dust, the presence of either of which may be known by its not subliming.

The other compound is the Ammonio-chloride of Mercury, obtained by adding a solution of ammonia to a solution of bichloride of mercury, when a precipitate falls, which is to be washed and dried.

Properties and Uses.—It is in the form of a white powder, which dissolves without effervescence in

hydrochloric acid; and if heated with a solution of potassa, it evolves ammonia and assumes a yellow colour.

Different views are taken by chemists of the changes that occur in the formation of this compound, which are very complex. Phillips regards this salt as constituted of two double salts and a nitruret of the metal; thus:

1 atom	Bichloride of Mercury and Ammonia	272 + 17 = 289
1 ,,	Chloride of Mercury and Ammonia	236 + 17 = 253
1 ,,	Nitruret of Mercury . .	200 + 14 = 214
	Equivalent	756

According to Brande, when "white precipitate" is procured by the addition of carbonate of soda or potassa (not in excess) to a cold aqueous solution of equal parts of corrosive sublimate and sal ammoniac, an *amido-chloride of ammonia and mercury* results, consisting of,

2 atoms	Mercury . . .	100 × 2 = 200
2 ,,	Nitrogen . . .	14 × 2 = 28
6 ,,	Hydrogen . .	1 × 6 = 6
2 ,,	Chlorine . . .	36 × 2 = 72
		306

It is employed for the destruction of lice, being sprinkled over the skin, or made into an ointment. Its purity is known by its non-volatility at a red heat.

Hyosciami Extractum, *Extract of Henbane.*

Henbane is a biennial plant, growing on the sides of roads among rubbish, in most parts of Europe, and also cultivated in gardens for the druggist. It flowers from June to August, and the fresh herb has an unpleasant odour. The leaves are the officinal parts: they are to be collected in the second year of their growth, just before the flowering stalk appears, and, being bruised in a mortar, they yield by subsequent expression a large quantity of juice, in which the active properties of the plant reside. This is to be evaporated, without suffering the dregs to subside, until it acquires a fit consistence. A better mode is to subject the juice to spontaneous evaporation in shallow vessels, exposed to a brisk current of air. One hundred-weight of the leaves yield between four and five pounds of extract.

Composition.—An alkaloid called *hyosciamia*, and the usual principles met with in vegetable extracts, as gum, starch, &c.

Properties and Uses.—Extract of henbane has a dingy-olive colour, a peculiar and disagreeable smell,

and a bitterish saline taste. It is a narcotic, anodyne, and antispasmodic, and may be given in doses of ʒj to ʒij.

Mr. W. Wright advocates the use of a solution of the extract in the spirit of nitric ether,—constituting an ETHERIAL TINCTURE OF HENBANE,—in the proportion of one part of the former to eight parts of the latter, as an antispasmodic. He gives it in doses of two ounces, either with or without aloes in combination; and speaks highly of its effects.

The extract has also been successfully resorted to in cases of chronic cough, placing it on the tongue of the animal, so that it may slowly dissolve; or it may be given in the form of ball, combining it with other agents. It has likewise been employed for the purpose of allaying constitutional irritation, induced by wounds, &c.; it having this advantage over opium, that it does not produce constipation of the bowels, but rather the reverse, on which account it has sometimes been conjoined to purgatives, to prevent tormina.

Externally applied, its action resembles that produced by the extract of deadly nightshade.

IODINIUM, *Iodine.*

I think it may now be safely said that iodine and its compounds have at length come into general use among Veterinary Surgeons.

Iodine is obtained from the mother-water that remains after the procuration of carbonate of soda from kelp. The available compound in solution is an iodide of potassium. To this sulphuric acid in excess and the peroxide of manganese are added, and the whole being introduced into a stone retort, heat is applied, when the iodine passes over, along with water, in a state of vapour, and is condensed in the receiver and neck of the retort. It is subsequently washed and dried between folds of bibulous paper.

Decomposition.—In this process the iodide of potassium and the peroxide of manganese are acted upon by the sulphuric acid, iodine is set free, and the sulphates of potassa and manganese are formed, as shown in the following diagram :

Materials.	*Constituents.*		*Products.*
1 equiv. Iodide Potassium=166	Iodine =126		Iodine =126
	Potassium = 40	Potassa	
1 equiv. Peroxide Manganese=44	Oxygen = 8		
	Protoxide Manganese =36		
2 equiv. Sulphuric Acid . =80	Sulphuric Acid . =40		Sulphate Potassa =88
	Sulphuric Acid . =40		Sulphate Manganese =76

Properties and Uses.—Iodine is solid at the ordinary temperature of the air, and occurs in dark coloured scales, which have a metallic lustre, and a specific gravity of 4·946. When heated, it forms rich violet-coloured vapours,—hence the name

given to this substance,—whose specific gravity is great, being 8·716. It has a pungent odour, an acrid taste, and it tinges the skin of a brownish-yellow colour. The weight of its atom is 126. Its action is that of a stimulant to glandular structures, and the forms in which it is employed externally are those of a liniment and ointment. Internally it may be given in doses of from five to ten grains twice in the day, although there are objections to its being administered uncombined, as iodine only enters the circulation in the form of hydriodic acid, or as an hydriodate, and, unless it undergoes this change it will accumulate in the system.

Tests.—The purity of iodine is judged of by its being soluble in alcohol, and entirely vaporised on the application of heat. This will not be the case if charcoal, plumbago, or the black oxide of manganese, substances with which it has been said to be adulterated, be present. Sometimes it is sold in a very moist state, which may be readily detected by pressing it between folds of bibulous paper. The character which distinguishes iodine is that of its forming an intense blue compound—the *iodide of amylum*—with a cold solution of starch. So delicate is this test, that water containing not more than one four-hundred-and-fifty-thousandth of its weight of iodine is rendered perceptibly blue by it. In the secretions it may be detected in the following manner:—First

add sulphuric acid to remove the alkaline base and set the hydriodic acid free; then pass through the solution a stream of chlorine gas, or add a little chlorine water, when the chlorine will unite with the hydrogen, and liberate the iodine, which may be tested by starch. Perhaps it should be remarked, that starch only becomes a test for iodine in a free state.

LINIMENTUM IODINII COMPOSITUM, *Compound Liniment of Iodine.*

Take of	Iodine	1 part,
	Soap Liniment	8 parts.

Dissolve.

UNGUENTUM IODINII, *Ointment of Iodine.*

Take of	Iodine	1 part,
	Lard	8 parts.

Mix. Some substitute for lard the milder ointment of mercury, by which a far more active compound is formed; and others add half a part of cantharides in powder, or of tartar emetic, by which absorption is promoted.

When administered internally, the form of tincture is advocated by many persons. If, however, it is long kept, it is apt to undergo decomposition.

TINCTURA IODINII, *Tincture of Iodine.*

Take of Iodine . . . . 1 part,
Rectified Spirit . . . 8 parts.

Dissolve.

The dose of this is from ʒj to ʒij, given twice or thrice a-day. In the practice of Mr. A. Packwood, farcy has yielded to it; and it may be employed in other diseases in which abnormal deposits are taking place, its effects as a resolvent being very powerful. Its activity may be increased by the addition of an equal quantity of the iodide of potassium.

The tincture of iodine has likewise been applied as a counter-irritant, and with a view to promote the absorption of effused fluids. It has been also injected into cavities, so as to cause adhesion of their parietes; and if applied with friction to the skin when depilated, it has been found to promote the return of the hair.

Preference, however, appears to be justly given by most practitioners to the iodide of potassium, a salt hereafter to be noticed.

LINUM USITATISSIMUM, *Common Flax.*

LINI SEMINA, *Linseeds.*

It is thought that the flax-plant originally came from the banks of the Nile, where it flourishes luxuriantly. It is, however, now cultivated largely in

this country for the sake of its ligneous principle. What is termed flax is prepared from the fibrous part of the bark. *Tow* is made up of the short fibres that are removed in heckling. From flax it is well known that linen is made, which being scraped forms *lint*, extensively used in surgery.

By far the greater quantity of linseeds are imported from the Baltic. They are contained in a pointed globular capsule, which is divided into five valvular cells; of a brown colour externally, glossy, and of a flattish oval shape, abounding with mucus which resides in the testa, and a fixed oil that is united with the parenchyma.

Composition.—Essentially farina, mucus, and fixed oil.

LINI OLEUM, *Linseed Oil.*

By expression, linseeds yield about one fifth of their weight of a fixed oil. This, when cold drawn, has a greenish colour; is pale, limpid, and brilliant, and possesses a mild, bland taste. Generally, however, heat is resorted to, when it is less pure, has a yellow colour, a strong odour, and a disagreeable flavour, and a larger quantity is obtained.

It is employed as a cathartic for the horse, in doses of from one to two pints; and, according to the testimony of Mr. Percivall, it is both more certain and safer in its effects than castor oil or olive oil.

To CATTLE it may be given in the like quantities; and, on the authority of Mr. Youatt, it is little inferior to castor oil as a purgative, while it is much cheaper.

To SHEEP it is occasionally administered when the sulphate of magnesia will not act, or when much intestinal irritation is present. The dose is from two to three ounces.

Its activity may be increased by the addition of a few drops of the oil of croton when found requisite.

A liniment, or calcareous soap, formed by its combination with lime-water, in equal proportions, has been found of service in cases of burns and scalds. The addition of oil of turpentine has been advocated by some practitioners.

LINI FARINA, *Linseed Meal.*

After linseeds have been expressed, there remains behind a cake which is much employed for the fattening of cattle. It consists of mucus and farinaceous matter. When ground, it constitutes the linseed meal of the shops. This is used, mixed with bran, to form an emollient poultice, or for the purpose of giving bulk to other medicines. A preferable agent is the ground or crushed unexpressed seeds. But a little caution is here requisite, lest the unsus pecting practitioner be imposed upon by a mere

mechanical mixture of linseed meal and oil. Ordinary inspection, however, will suffice for the detection. I am indebted to Mr. A. Cherry, for a form for a very useful mass, in which many therapeutic substances may be exhibited. I have designated it

Common Mass.

Take of Linseeds, finely ground,
Treacle, of each, equal parts.

Mix them together with the hand or otherwise, so as to form a mass. This will be soft at first, but it will soon acquire a fit consistence, which will be retained for a long time. The addition of a little palm oil will effectually ensure this.

A convenient powder for giving bulk may be made by mixing together eight parts of any farinaceous matter, such as pea-meal, and one part of turmeric-root in powder.

Lini Infusum, *Infusion of Linseeds.*

As the mucus resides in the outer covering of the seeds, all that is necessary for its abstraction is to pour boiling water over them, in the proportion of one pint of water to an ounce of the seeds, and let it remain until cold, when a viscid solution will be obtained. This is used as a vehicle for exhibiting insoluble powders in a state of suspension; it is also

valuable as a demulcent in catarrhal affections, and diseases of the urinary organs, and of the bowels. By boiling the seeds, the decoction contains, besides the mucus, a portion of oil.

MAGNESIUM, *The Metallic Base of Magnesia.*

This metal was discovered by Sir H. Davy. It may be obtained by heating together in a tube, anhydrous chloride of magnesium and potassium or sodium, when a chloride of either of these metals is formed, and magnesium set free. The tube, when cold, is to be broken, and the fragments placed in cold water, when the metal is thus separated from the salt.

Properties and Uses.—Magnesium has a silvery lustre, is malleable, fusible at a red heat, not sensibly acted upon by cold water, or tarnished by exposure to air, but, if heated in it, burns and produces magnesia.

Its medicinal compounds are the oxide and its carbonate and sulphate. Weight of its atom 12. Specific gravity about 2.

MAGNESIA, *Magnesia.* Old Name: Calcined Magnesia.

MAGNESIA is obtained by heating to redness in a crucible, for two hours, the carbonate of magnesia,

when the carbonic acid will be driven off in a gaseous state, and the *oxide of magnesium* remain behind.

Composition.—1 atom Magnesium	. .	12
1 „ Oxygen	. . .	8
Equivalent	. . . .	20

Properties and Uses.—Magnesia occurs as a white, inodorous, and tasteless powder, when pure, nearly insoluble in water, with which it combines to form a definite hydrate, but does not become hot as lime does. It has, when moistened, an alkaline re-action, and has been given as an antidote for over doses of the acids, which it neutralizes, and as an antacid it is alone employed by the veterinary surgeon.

Carbonate of Magnesia is procured by mixing together a hot solution of sulphate of magnesia and carbonate of soda; boiling the mixture for two hours, constantly stirring, then pouring off the liquor, and washing the precipitate and drying it.

Decomposition.—Mutual decomposition here takes place, and carbonate of magnesia and sulphate of soda are the result.

Materials.	*Constituents.*		*Products.*
54 Carbonate of Soda	Soda	32	Sulphate of Soda . =72
	Carbonic Acid	22	
60 Sulphate Magnesia	Sulph. Acid	40	
	Magnesia	20	Carbonate of Magnesia =42

Composition.—The above diagram makes the compound to consist of

1 atom Magnesia	. . . . . .	20
1 " Carbonic Acid	. . . . .	22
Equivalent	. . . . .	42

Generally, however, a little water is present; since, according to Phillips, by the operations of boiling, washing, and drying, one fifth of the carbonic acid is replaced by water, so that it is a compound of a carbonate with a hydrate.

Properties and Uses.—Carbonate of magnesia is colourless, inodorous, insipid, and insoluble in water. It is decomposed by the stronger acids, and acidulous salts, which it neutralizes, hence with all such it is incompatible. Its action, medicinally, is that of an antacid, and it has been resorted to for correcting any acidity in the primæ viæ, although it is but rarely used by the practitioner of veterinary medicine.

MAGNESIÆ SULPHAS, *Sulphate of Magnesia.*

The name of *Epsom salts* has been given to this compound, from it having been found to exist in the waters of a spring at Epsom, in Surrey. A large quantity of it used to be procured from the bittern that remains after common salt has been obtained

from sea-water; but as this contained some muriate of magnesia, which is a deliquescent salt, the compound frequently became damp. This is now obviated by preparing it from the magnesian lime-stone, according to a process invented by Dr. Henry. The mineral is calcined, to expel the carbonic acid, then treated with diluted muriatic acid, to take up the lime; and to the precipitated magnesia is added sulphuric acid, so as to form a sulphate of magnesia. Another method consists in treating the mineral with dilute sulphuric acid, when carbonic acid escapes in a gaseous state, and a sulphate of lime and a sulphate of magnesia remain behind. These salts are separated from each other by decantation and crystallisation.

Composition.—	1 atom Magnesia . .	=	20
	1 atom Sulphuric Acid	=	40
	7 atoms Water . 9×7	=	63
	Equivalent . . .		123

Properties and Uses.—Sulphate of magnesia crystallises irregularly, either in six-sided or quadrangular prisms, or in acicular crystals. Its taste is bitter and unpleasant; it is soluble in its own weight of water at 60°, and in three fourths of its weight of boiling water.

The action of this drug on the horse is variable. Sometimes its influence is that of a diuretic, and at

other times it proves a laxative. It has been found to alter the character of the secretions from the alimentary tube; and hence, in spontaneous diarrhœa, its exhibition has often been followed by a natural state of the egesta.

It is chiefly employed as a purgative for CATTLE and SHEEP, and for these animals it is the general aperient. The dose for the former is from a pound to a pound and a half; for the latter, from an ounce to two ounces. Its action may be quickened by the addition of croton seed or farina; or a portion being withheld, a small quantity of either of these may be substituted, by which purgation will be ensured. Some practitioners combine sulphur. A carminative, such as ginger, should never be withheld; the quantity added being from half a drachm to two drachms, or even more.

According to Thomson, the operation of this salt depends on its causing an augmentation of the discharge from the biliary and pancreatic ducts, which excites the intestines to increased action; while Liebig makes it depend on the great affinity it has for water, and refers its action to endosmose.

MYRRHA, *Myrrh.*

This is a gum-resin, an exudation from a species of *Balsamodendron*, a native of Arabia, where it

forms stunted groves, intermingled with the acacia, of which it was once thought to be the produce. At first it is oleaginous in appearance, but it soon thickens on exposure to the air, becoming opalescent and of a whitish-yellow colour, which, when hardened, changes to a reddish-yellow. It is imported into the market from the East Indies in chests, containing from three to four hundred weight each.

Composition.—	Resin and Essential Oil . . .	34
	Gum and Extractive	66
		100

Properties and Uses.—Myrrh is frequently mixed with other gums, and much extraneous matter. It may be distinguished by its irregular form and fragrant odour, arising from the presence of a volatile oil, which exudes on pressing a broken piece with the nail. Those pieces should be chosen which are opaque, light-coloured, and free from dirt. It is soluble in a mixture of alcohol and water; but if the quantity taken up be large, a turbidity ensues on the addition of more water. The alkalies increase its solubility.

Internally, myrrh is a stimulating tonic, and an antiseptic. It is not commonly given to the HORSE, although it has been advocated in chronic coughs, in doses of from ʒij to ʒiv, combined with opium. To CATTLE it is frequently administered in doses of

from ℥ss to ℥j, and it has been supposed to have a specific action on the uterus. Externally, the spirituous solution is employed as an excitant to indolent and vitiated ulcers, and as a general stimulant to wounds. It corrects the fœtid discharge, and induces healthy granulations to be thrown out. The best form is that of a compound tincture, which is given under the article ALOES, p. 104. When first applied, it proves a powerful excitant from the spirit which it contains; this soon evaporates, leaving a gum-resinous coating behind, by which the wound is protected and the stimulating action kept up.

The simple tincture of myrrh, made as follows, is an excellent application to ulcers of the gums and canker in the mouth, in all our domesticated animals.

TINCTURA MYRRHÆ, *Tincture of Myrrh.*

Take of Myrrh, bruised	3 ounces,
Rectified Spirit	2 pints.

Macerate for fourteen days, and strain.

OLIVÆ OLEUM, *Olive Oil.*

This is a fixed oil, obtained by expression from the fruit of the olive tree, which is now ranked among the plants indigenous to the south of Europe, although it is supposed to be a native of Asia. It is

cultivated abundantly in the Greek islands; also in France, Spain, and Italy.

The fruit, which is an oval plum, is gathered when it is fully ripe, being then of a violet colour, and crushed in a mill, the stones of which are set wide apart so that they may not break the kernel. The pulp is then put into bags made of rushes, and subjected to gentle pressure, when it yields a quantity of bland scentless oil. This is the finest; hence it has been designated virgin oil. A second sort is obtained by fermenting the bruised mass, and again subjecting it to pressure. It comes into this country from Lucca and Florence in jars and flasks.

Properties and Uses.—Olive oil can be viewed by the veterinary surgeon only as a demulcent and emollient, for, as a laxative, it is very mild and even uncertain in its action. Its colour, should be a pale yellow, odour and taste none, but soft and agreeable in the mouth. It is the lightest of all the fixed oils, its specific gravity being ·915. It boils at 600°, or rather at this temperature it undergoes decomposition; and congeals at 38° F., which is regarded as a test of its purity. It is commonly used as a vehicle for more active substances, and particularly in the formation of liniments and some ointments. For ordinary purposes, that which is sold in the shops by the name of second olive oil, it being two years old, is as good as can be required.

Morrhuæ Oleum, *Oil of Cod.*

This oil is both imported and procured in this country from the liver of the cod fish (*Oleum Jecinoris Aselli*). It is obtained by boiling the liver of the fish, and also by allowing this organ to undergo decomposition by exposure to the sun, when the oil escapes, and is caught in any convenient vessel.

When properly prepared, it is straw coloured and transparent, having the smell of the fish, and an oily and somewhat unpleasant taste.

Composition—Dr. Jongh having analysed cod-liver oil, found it to consist of "oleate and margarate of glycerin, some biliary matter, with traces of butyric, acetic, and other organic acids; also of iodine and bromine, and a very minute quantity of resinous-like matter, termed by him *Gaduin*," supposed by Phillips to be an impurity arising from partial decomposition of the oil.

The oil of the liver of other fishes has been used in the same cases as cod's-liver oil, and why not? Such, for instance, as the ling (*Lota molva*). Lately in India, Presidency of Madras, several fishes have been found to furnish an oil equal in medicinal action to that of the cod; such as the *Seer*-fish, or *Vungarum;* also a species of shark, called the white shark, the oil from which is remarkably pure and

very efficacious as a therapeutic agent; and a variety of skate, called *Therika*, the oil from which has been found superior to any of the other kinds.

Analyses of these oils having been made in England, they have been found to contain the same proximate principles as the cod-liver oil, and the same elementary substances; although, perhaps, in appearance a little improvement might be made by filtering them at a low temperature, as they contain a somewhat large quantity of insoluble matter.

One of the tests applied to cod-liver oil is sulphuric acid, which develops a violet colour, depending on the reaction that obtains between this acid and biliary matter in the oil, to which, by some persons, its efficacy has been attributed. As this is common to the oil obtained from the livers of most fishes, there is no reason why one kind of oil should not prove as valuable a medicinal agent as another.

Properties and Uses.—The dark coloured, strong smelling, or rancid oils are not considered fit for use; yet many prefer the unpurified oil to that now sold in the shops under the name of "Purified Cod-Liver Oil."

For many years this oil has been resorted to medicinally, but only of late it can be said to have come into general use. It has been considered by some writers as an alterative, and by others as an anti-scrofulous remedy; its action by them being

thought to be owing to the minute quantity of iodine and bromine found in it. The probability is, that its efficacy is rather referable to its becoming assimilated; it being, in the popular sense of the term, nutrient matter, since animals have been found to become very fat during its administration.

It has been resorted to in cases of debility, accompanied with emaciation, supervening inflammatory attacks, and also influenza in the horse; threatening the formation of tubercles in the lungs, or phthisis pulmonalis. It likewise has been found to arrest the progress of chronic diseases, especially of the respiratory organs.

The dose may be eight ounces at first, given two or three times in the day, and which may be gradually augmented to double this quantity, withholding it for a time should inappetence or nausea take place.

Tests.—Its colour, taste, and smell, appear to be the only tests on which any reliance can be placed.

OLEUM PALMÆ, *Palm Oil.*

This vegetable butter was described in my former editions as being obtained from the kernels of the fruit of the *Cocos Butyracea*, or Mackaw tree, a species of palm found in the Brazils. The nut being broken, the kernels are first coarsely pounded, or ground in a mill, and then macerated in hot water

to separate the oil, which, rising to the surface, concretes as it cools. It is afterwards purified by washing in hot water. Sometimes expression between two plates of iron is resorted to. From $\frac{7}{16}$ to $\frac{8}{16}$ of a fixed oil are thus obtained. The palm oil now met with in the shops appears, however, to be imported from Guinea, where it is procured by expression from the fruit of the *Elais guineensis.*

Composition.—	Stearin	31
	Elain	69
		100

Properties and Uses.—Palm oil is of the consistence of hogs' lard, granular, and has a rich orange-yellow colour, which it loses on exposure to the air, as it does its odour, which is agreeable, resembling that of violets. It is an emollient, and sometimes used in the place of lard, with which it is frequently adulterated, turmeric root in powder being added to give to the compound colour. The fraud is easily detected by melting.

Oleum Rapi, *Rape Oil.*

A fixed oil obtained from the seeds of the wild rape—*brassica rapus*—by expression, and used for liniments instead of the olive oil. For common purposes, and when required to be more stimulating, as

in mange, &c., the whale oil—*cetaceum oleum*—may be substituted.

Oleum Ricini, *Castor Oil.*

This is a fixed oil, obtained by the expression of the seeds of a gourd growing in Java and throughout India. It would seem to have been used from the very earliest times, both by Hindoos, Egyptians, and Greeks; indeed, its name is derived from the Greek for "Tick," which insect the seeds resemble in appearance. In India, the plant attains to the height of 16 to 20 feet, living for many years. The oil may be also obtained from the seeds by boiling them in water; or, as before said, by expression, with or without the aid of heat. That which is cold-drawn is preferred. The market is supplied with it from the East and West Indies and North America. It should have only a pale straw colour, a faint, though perhaps, not pleasant smell, and but little acridity. Its purity is ascertained by its being "entirely dissolved in its own volume of alcohol." Its action is that of a laxative, and it is often resorted to for the dog, being given in doses of from half an ounce to an ounce. Its activity may be increased by the addition of the oil of turpentine, when it becomes an efficient purgative to this animal, but not always a safe one.

Linseed oil, as already stated, is to be preferred to it for the horse, and also for cattle and sheep, its effects on those animals being that of an irritant, without a corresponding action on the bowels.

Composition.—One hundred parts of the seeds yielded

23·82	hard covering,
69·09	kernel,
7·09	moisture.
100	

The kernels gave

46·19	fixed oil,
2·40	gum,
20·00	starch and lignine,
·50	albumine.
69·09	

Mialhe says, the intimate composition of this oil is not sufficiently known to enable us to determine its effects on the system. In this respect we are reduced to conjectures based upon this and that analogy. The purgative action may be attributed—(1) to a volatile acid analogous to the crotonic acid of the oil of croton; (2) to a resinous matter of great acridity characteristic of all the euphorbiaceæ; (3) to a property peculiar to it.

As to the acid analogous to crotonic acid, it is so

volatile, as M. Gibourt has shown, that it will not long remain in the oil. Soubeiran thinks that it is in the resinous matter its purgative properties reside, for he has obtained from this oil a very acrid resin, in every respect similar to the resin common to the euphorbiaceæ.

Opium, *Opium*.

The inspissated Juice of the unripe Seed-vessels of the White Poppy—*Papaver Somniferum.*

This species of poppy is a native of the southern parts of Asia, where it flowers in February. It has been found growing wild in this country, and is largely cultivated at Mitcham, in Surrey, for the sake of its capsules, which are employed in medicated fomentations, and also its seeds, which yield, on pressure, a bland oil, used in the arts. Here the flowers do not appear till June or July.

Every part of the plant abounds with a milky juice; but that yielded by the seed-vessels is alone employed medicinally. In the East, as in Persia, Turkey, and India, the manner of preparing opium is extremely simple. The capsules or seed vessels, about a week after the petals have fallen from the stalk, are wounded with a five-edged cutting instrument, both in a transverse and vertical direction, so that the cells containing the juice may be opened. This is done

in the evening; and, in the morning, the juice which has been thrown out during the night is scraped off by means of a piece of iron, put into an earthen vessel, and evaporated in the sun until of a due consistence. It is afterwards formed by the hand into masses, and then covered with tobacco or poppy leaves. That which comes from Turkey is usually invested with the reddish capsules of a species of rumex, which is considered to be indicative of its goodness. Opium is imported into this country in chests, and the market is principally supplied from Turkey and India. That from Turkey is preferred, as it contains a larger quantity of the soporific principle.

Composition.—No article of the materia medica has so much occupied the attention of chemists as this drug. Through their labours we have arrived at a knowledge that the activity of this valuable agent depends essentially upon the presence of two principles, a *meconate of morphia* and *narcotine;* besides which, there are found in it several of the proximate principles of vegetables, as gum, resin, extractive, volatile, and fixed oil, caoutchouc, a brown acid, and the sulphates of lime and potassa, with certain alkaloids denominated codeia, narceia, meconia, and thebaina or paramorphia.

The alkaloid, *morphia,* united to its peculiar acid, the *meconic,* gives to opium its soporific properties. To *narcotine* has been attributed the stimulating

effects which are known to take place on the administration of this drug, before its sedative action is manifested. It therefore follows, that, if the one be separated from the other, an advantage is gained; and this has been effected for the practitioner of human medicine. By the veterinary surgeon, however, the opium of commerce is commonly made use of; none of the salts of morphia, that I am aware of, being employed by him. I have given several of them, but not with such results as would warrant me in recommending them to particular notice.

Properties and Uses.—Opium, when good, is a solid, opaque, tenacious substance, yielding to pressure, and softening in the hand; of a reddish-brown colour, tolerably smooth and uniform in texture, and having a peculiar heavy narcotic odour. When dried and powdered (in which state it should be kept in the pharmacy in closely-stoppered bottles), it has a light fawn colour, and its taste is nauseous and bitter. It should be rejected when it is either very soft, greasy, friable, of a black colour, or mixed with many impurities; also when it has a sweetish taste, or marks paper with a brown continuous streak if drawn across it, or when it melts like wax, and forms a yellow solution with water. It is partly soluble in water, alcohol, ether, wine, vinegar, and lemon-juice. The best solvent is diluted alcohol.

Opium is an invaluable narcotic and antispasmodic;

it also acts indirectly as an astringent through its influence on the liver. It may be given in doses of from ʒj to ʒij, in the form of a watery or a spirituous solution, or of ball; the last two forms being most desirable when it is employed as an antispasmodic. The watery solution, or perhaps, more correctly speaking, the watery mixture, is to be advocated when its narcotic effects are principally called for. I am acquainted with several practitioners who rely on the aid of this agent after blood-letting, in cases of inflammation of the bowels, uterus, &c., and they speak of it in terms of the highest commendation; and the instances that have fallen under my notice, in which this drug has been employed, enable me to corroborate their statements. The quantity usually administered is two drachms at first, rubbed down with warm water, so as to form a draught; and a drachm is given every hour afterwards, until relief is obtained. The pain is subdued by it, and sleep frequently supervenes. Occasionally the first dose is blended with oil, although little is to be apprehended from the torpidity of the bowels, which sometimes takes place, as this can be easily obviated by the exhibition of half a pint or more of linseed oil on the following morning. In smaller doses, opium has been recommended in chronic coughs, when it has afforded marked relief by allaying irritation. As an astringent in cases of superpurgation, a drachm may

be thrown up in the form of a clyster, the menstruum being thin starch or gruel; this may be repeated if found necessary. It may also be given in combination with chalk.

As an antispasmodic, the spirituous solution or tincture is generally resorted to, in doses of from f℥j to f℥ij. A watery solution of aloes is sometimes added to it, or the oil of turpentine is blended with it, the proportions of the former being from f℥ij to f℥iv, and of the latter, f℥j to f℥ij. The tincture, commonly called LAUDANUM, is thus made:

TINCTURA OPII, *Tincture of Opium.*

Take of Hard Opium, powdered 3 ounces,
Proof Spirit . . . . 2 pints.

Macerate for fourteen days, and filter for use.

In addition to this being employed as an antispasmodic, sometimes a few drops are directed to be poured into the eye in the second stage of ophthalmia, when the inflammatory action is lessened, and yet much suffusion remains. Its influence would appear to be twofold; it induces healthy action, and, at the same time, allays irritation.

Mr. C. Dickins advocates the use of what he designates the ETHERIAL TINCTURE of OPIUM, made by macerating for twenty-eight days—

Turkey Opium	1 pound in
Spirit of Nitric Ether	8 pounds.

the dose of which is from f℥ss to f℥ij.

In a letter received from him respecting it, he says, "As a remedy for spasmodic cholic, it has with me no rival. It supersedes the oil of turpentine, since there is not that to be apprehended from it should inflammation have commenced. I use it also in cases of gastro-enteritis, so common with hard-worked horses, which cannot bear the abstraction of blood. An ounce or two given in combination with aloes will almost work wonders.

"Sometimes we meet with cases of spontaneous purging in cattle attended with rigors, produced by their being exposed to wet and a north-east wind: here I give it with the sulphate of magnesia. Frequently I prescribe it in conjunction with a mild aperient after long and difficult parturition, when the vital powers begin to flag. In sheep also, if judiciously employed, I think it might prove valuable in the lambing season."

In such cases as those referred to by Mr. Dickins, it long since suggested itself to me that, if an *ammoniated tincture of opium* were formed, by substituting the aromatic spirit of ammonia,—made according to the formula given by the Edinburgh College, and inserted in this Manual because it is to be preferred

for veterinary purposes,—for proof spirit, a far more valuable compound would be obtained. It may, perhaps, be considered by some persons deserving a trial, although, I confess, I am not desirous of multiplying formulæ without just reasons for doing so.

All compounds are nearly inert, in the diarrhœa or dysentery of CATTLE and SHEEP, into which opium does not enter. On account of the irritable character of the mucous membrane of the stomach of the DOG, according to Mr. Youatt, it is best administered to that animal in the form of the syrup of white poppies.

Incompatibles.—The alkalies and their carbonates, which precipitate the morphia from a watery solution of opium; also the acetate and diacetate of lead, bichloride of mercury, nitrate of silver, the sulphates of zinc, iron, and copper, and all astringent vegetable infusions.

Although the use of opium has been condemned by some persons on account of the violent effects induced by it under certain states of the system, yet I believe it to be an agent of great power and value, and one which the practitioner of veterinary medicine cannot afford to dispense with. And as it respects an over-dose, but little is to be apprehended, as very large quantities may be given to the horse almost with impunity. I have frequently administered half an ounce and an ounce, and, for experimental purposes, two and four

ounces have been given, and no very serious effects have resulted. Should we, however, have reason to suppose that this drug has been productive of fatal consequences, arising from circumstances already adverted to, I should apprehend the odour, which is peculiar and characteristic, would be sufficient for our decision in a post-mortem investigation.

"In medico-legal researches," says Christison, "the most important characters of opium, or its preparations, to be kept in view are, the peculiar odour, the action of nitric acid on morphia, and that of the salts of iron on meconic acid. The odour is heightened, though also modified, by raising the temperature of the fluid containing opium to about 200°. When no odour is remarked on doing so, it is seldom possible to develope the two remaining characters. These cannot be applied in the instance of organic mixtures without first making an aqueous extract, and then, from this, an alcoholic one. If the alcoholic extract present the peculiar bitterness of opium; if its watery solution, when acted on by ammonia, cautiously added so as to avoid an excess, yields a precipitate which becomes yellow with nitric acid; and if, after the separation of this precipitate, the remaining fluid gives, with acetate of lead, a precipitate, which, when decomposed in water by sulphuretted hydrogen, imparts to the water the property of becoming deep cherry red with sesqui-

chloride of iron,—the evidence of opium is irrefragable."

PETROLEUM, *Petroleum.*

Literally *rock-oil.* A liquid bitumen which flows from fissures in rocks in many parts of the world, and supposed to be produced by the decomposition of vegetable matter, or coal, by subterranean fires. In the island of Barbadoes it is met with in large quantities floating on the surface of lakes; hence the name *Petroleum Barbadense*, BARBADOS PETROLEUM, or Barbadoes Tar. Sometimes it is distinguished by the terms mineral tar, and green naphtha.

Composition.—The ultimate elements of Barbadoes petroleum are carbon and hydrogen, with small quantities of oxygen and nitrogen.

Properties and Uses.—At ordinary temperatures it has the consistence of treacle, is of a blackish colour, and reflects a greenish light. The odour and taste are bituminous. It is inflammable, burning with much smoke, and leaving a carbonaceous residuum. Subjected to distillation, it yields a yellow oily fluid (naphtha), and what remains in the retort is analogous to asphaltum. It is of less specific gravity than water, in which it is insoluble, but mixes readily with oils.

Some have advocated the use of this agent on account of its stimulating influence on the organs of

secretion, particularly the skin, kidneys, and mucous surfaces; hence it has been stated to be a sudorific, a diuretic, and an expectorant; and it has been thought to afford relief in coughs, whether recent or chronic, and also in other affections of the respiratory organs, as broken wind, thick wind, and roaring. The dose may be from ℥ij to ℥iv, or even more, given either in the form of draught or balls.

I confess I have not seen much benefit follow its use, the kidneys having been the only organs visibly affected by it in the experiments to which I refer; but a more extensive trial of it is perhaps warranted, from the high terms in which it has been spoken of as a remedial agent, particularly by Mr. Charles Clark.

Externally it is a stimulant, and may be employed in many cutaneous diseases, as lepra, herpes, and mange: also for wounds, chronic ulcers, grease, &c., in which, being applied by means of a fine brush, it quickly brings about the healing process. It has likewise been recommended in foot cases; but whether its properties are such as to supplant the use of the common vegetable tar, I will not take upon myself to assert.

Pimenta Baccæ, *Pimenta Berries.*

Common Names: Allspice, Jamaica Pepper.

Pimenta berries are the unripe seed-vessels of a

tree growing in South America and the West India islands, particularly Jamaica. As soon as the seed-vessels are properly formed, they are gathered by the hand, and, being spread on cloths, are exposed to the action of the sun's rays, when they change from a green to a brown colour. A tree will sometimes yield 150 lbs of raw fruit, or 100 lbs when dry.

Composition.—Volatile oil, resin, extractive matter, tannic, and gallic acid.

Properties and Uses.—Pimenta berries have an aromatic and agreeable odour, resembling a mixture of spices; hence the name *allspice*. Their taste is warm and pungent. These qualities chiefly reside in the cortical covering, and are extracted by proof spirit. The berries should be chosen small and hard.

Medicinally they may be regarded as a stimulant and tonic, and may be given in doses of from ʒij to ʒiv.

A Tincture of Pimenta, made by macerating for several days one pound of the bruised berries in six pints of proof spirit, has been strongly advocated by Mr. Bracy Clark as an antispasmodic. The dose is four ounces every hour until relief is afforded.

Pix Abietina, *Burgundy Pitch.*

This is obtained from the spruce fir by incisions being made into its bark during the summer months;

whence a resinous juice tardily flows, and which concretes in flakes on exposure to the air. These are removed as they accumulate by an iron instrument; and, being melted in boilers with water, the resinous fluid is pressed through cloths, and poured into casks for exportation. The market appears to be supplied principally from Saxony.

Properties and Uses.—Burgundy pitch is a brittle opaque compound, having a dull yellow colour, and a terebinthinate odour.

It is a stimulant and rubefacient in its action, and, when softened with a little of the oil of turpentine, will form an adhesive plaister, which may be substituted for the "charge" of the farriers.

A fictitious article is made by druggists by melting together common turpentine and resin, and the fraud is not easy of detection; but as all the compounds of turpentine possess nearly the same medicinal properties, it is not, perhaps, a matter of much moment.

PIX LIQUIDA, *Tar.*

This compound is obtained by subjecting billets of the fir woods to smothered combustion. For this purpose, a conical hole is dug in the earth, and at its bottom a gutter or channel is made, which is connected with a reservoir: the side of a hill is therefore commonly chosen. The excavation being filled, the wood

is raised in a conical form above it, and covered with turf. The pile is now kindled near the top, and combustion going on from above downwards, the wood is converted into charcoal, while the terebinthinate vapours and smoke becoming condensed, assume the liquid form, which, flowing out through the channel or gutter, constitutes common tar. The northern states of Europe largely supply the market; but considerable quantities are now obtained by the destructive distillation of wood for the procuration of pyroligneous acid.

Composition.—Tar is evidently the result of the decomposition of the resinous juices of the wood; but it also contains other vegetable matters. It may be designated a mixture of resin, empyreumatic oil, charcoal, and acetic acid.

Properties and Uses.—Tar is of a brownish-black colour, adhesive, and varying in consistence with the temperature of the air. Thinly spread out, its volatile parts evaporate, and a resinous matter remains behind. Its taste is hot and disagreeable, the smell penetrating, and not objected to by most persons.

It is mostly used as an external applicant, being a rubefacient and excitant. When applied to the skin, it has been found serviceable in mange and other cutaneous affections, having been previously mixed with oil or lard; but the pyroligneous oil of tar has justly obtained the preference at this Institution.

It is a common remedy for some diseases of the feet. Frush, or thrush, in the horse, generally yields to the stimulus imparted by it; and if mixed with a little grease, and smeared over the wall and sole, it gives elasticity to the horn, and causes an increase of its growth. These effects are to be seen in the plan now very generally adopted of interposing leather soles between the shoes and feet, and filling the interstices with tow saturated with tar. But the compound employed at the College for this purpose is the following:

Stopping for Feet.

Take of Common Tar . . . . 2 parts,
Soft Soap . . . . 1 part,
Ground Linseeds, a sufficient quantity to give tenacity to the whole.

This is spread over the sole of the foot to about the thickness of a quarter of an inch, and then a layer of tow is laid on it, and over all the leather is placed.

For Cattle, "tar spread upon coarse cloth is the best covering for broken horns, and excludes both the fly and atmospheric air. It is useful for the same purpose in cases of wounds puncturing the belly or chest." It will also be found of service in slight attacks of foot-rot in sheep.

As a common foot ointment for all our domesticated animals, the following may be employed:

UNGUENTUM PICIS LIQUIDÆ, *Ointment of Tar.*

Take of Common Tar,
Lard, and
Resin, of each equal parts.

Melt together, so as to form an ointment.

A very common application for that phagedenic ulceration to which the vascular parts of the foot are so subject, denominated *canker*, is a mixture of tar and nitric acid. The proportions usually employed are, four of the former to one of the latter. On being mixed together, mutual decomposition of a portion of each takes place. And although the action of the concentrated acids on bituminous substances appears not to be well understood, yet, when their union is brought about suddenly, it is always accompanied by an elevation of temperature and the extrication of much gaseous matter. This arises from the oxygen of the nitric acid combining with the carbon and the hydrogen of the tar to form carbonic acid and water, which being rendered gaseous by the heat, in their escape cause the compound to appear in a state of ebullition; while the nitric oxide disengaged, mingling

with the atmospheric air, becomes nitrous acid. Its temperature is then about 160°. By long standing a viscid resinous matter is deposited with some carbon, which substance resembles artificial tannin.

A method more in accordance with science would be, to dress the fungoid granulations either with undiluted or diluted nitric acid, as the case may require, and, afterwards, apply the tar, giving suitable compression by means of bandages.

Pix Nigra, *Black Pitch.*

If tar be subjected to distillation, an empyreumatic oil passes over into the receiver, and a resinous mass remains behind, which is pitch; but it is very rarely thus obtained. It is more commonly procured by setting tar on fire, and burning it until it becomes of the required consistence, which is known by dipping a stick into it. Three barrels of tar yield about two of pitch. It is also made by boiling together refuse resin and common tar.

Pitch is more adhesive than common tar, and may, like it, be designated a rubefacient. Occasionally it forms the basis of coarse plasters, but it is not very generally used, except for the bandages round the hoof in sand-crack, and occasionally as a "charge;" for which the Burgundy pitch, before spoken of, is a preferable agent. The following form has been

given by Mr. S. Fisher, in his PRIZE ESSAY on "Diseases of the Bursæ Mucosæ," which may be designated a

Mercurial Charge.

Take of Black or Burgundy Pitch,

Yellow Wax, of each	. . .	$1\frac{1}{2}$ pound,
Strong Mercurial Ointment	.	6 ounces,
Iodine	. . . .	6 drachms.

To the melted pitch and wax add, while cooling, the mercurial ointment and iodine previously blended together, and intimately mix.

PLUMBUM, *Lead.*

This metal is familiarly known to most persons. It rarely occurs native in the pure state, but it is found largely mineralized with sulphur, oxygen, and many acids, forming a great variety of ores.

The native sulphuret is an abundant mineral, and from it the greater quantity of the metal is procured by the usual processes of washing and reduction. The ore is broken into small pieces, washed in water, and exposed to a strong heat in a furnace, in order to separate the sulphur; it is then fused with lime, and, the scoria being raked off, the fluid metal is run into moulds, in which state it has received the name of pig lead.

Lead has a bluish-white colour, and much lustre, which, however, it soon loses on exposure to the air, becoming covered with a crust of carbonate. It is insipid, but emits a disagreeable odour when rubbed. It stains the fingers and paper, has a specific gravity of 11·445, and is both soft and flexible. It melts at 610° F., and at high temperatures rapidly combines with oxygen. Weight of its atom, 104.

In its metallic state it would seem to exert but little if any action on the animal system; but, if oxidized or combined with acids, compounds are formed which prove energetic poisons. Horses and cattle in the neighbourhood of lead-works are, by the slow introduction of some of the compounds of this metal into the system, either by their drinking of the water impregnated with the carbonate, or eating of the herbage on which an oxide may have lodged, and which quickly becomes carbonated, very subject to affections of the bowels, accompanied with violent griping pains and constipation (*colica pictonum*), which commonly prove fatal. The approach of the disease is indicated by a disordered state of the stomach and a morbid appetite. The animals eat voraciously, and for a time acquire flesh. Nothing, indeed, appears to be refused by them; for even masses of lead ore and pieces of brick have sometimes been found in the rumen of cattle. This is soon followed by obstinate constipation of the bowels,

and laboured respiration, with other concomitants, which are extremely difficult to combat. It has been conjectured that the energy of the motor nerves is exhausted by the agent, the muscular fibre being rendered by it pale and flaccid. Its astringent action has been referred to its power of corrugating the circular order of fibres of the intestines. I would rather attribute it to the first-named cause, by which partial paralysis is induced, and the alimentary tube is, consequently, unable to pass onwards its contents. Poultry become affected with hemiplegia from the same cause.

Active purgatives, consisting of the sulphate of magnesia with croton, followed up by opium, are the remedies usually had recourse to. The human practioner advocates the use of alum in *lead colic*, combining it with opium or camphor. Its action is not well understood; but it is said to abate flatulence, mitigate pain, and open the bowels more certainly than any other agent, and that, frequently, when other powerful remedies have failed. Possibly its operation is referable to the chemical decomposition of the salts of lead; the sulphuric acid combining with the oxide of the metal to form an insoluble sulphate, while the remaining sulphate of potass acts as a purgative. As a preventive, dilute sulphuric acid may be given in the animal's water, so as to form an insoluble sulphate, which may be expelled by

the interposition of an occasional cathartic, if found necessary.

PLUMBI ACETAS, *Acetate of Lead.*

Old Names: Superacetate of Lead, Sugar of Lead, Cerussa Acetata.

Take of Oxide of Lead, in powder, 4 pounds 2 oz.
Acetic Acid, and
Distilled Water, of each, 4 pints.

Having mixed the acid and water together, add the oxide of lead, and a gentle heat being applied, filter the solution through paper; evaporate and crystallize.

Although such is the process directed by the College of Physicians for obtaining this salt, and which differs from their last formula, yet it is but seldom had recourse to.

Acetate of lead, or *sugar of lead*, as it is designated in the arts, is much used by calico-printers; and large quantities of it are made in Holland by immersing sheets of lead in pots half filled with distilled vinegar. The upper surface, by the action of the evaporating vinegar on it, first becomes oxidized and then covered with a carbonate: the coil being now inverted, the carbonate is changed into an acetate by solution in the vinegar; and the other portion of the lead, in its turn, is acted on in like manner. This process is continued until the vinegar becomes turbid, when the

solution is boiled down in tin vessels and set aside, so that crystals may form.

Decomposition.—This is an instance of single affinity. The acetic acid, by the agency of heat, combines with the oxide of lead, forming an acetate.

Composition.—1 atom Oxide of Lead		= 112
1 ,, Acetic Acid .		= 51
3 atoms Water	9 × 3	= 27
Equivalent		190

Properties and Uses.—Acetate of lead occurs in the shops in the form of irregular masses, made up of acicular four-sided prisms, aggregated together. It is inodorous, and has a sweet and astringent taste. It is soluble in twenty-five parts of water, which, if it contain but the least trace of carbonic acid, throws down a precipitate of the carbonate: this may be prevented by the addition of a little acetic acid. Its specific gravity is 2·35.

The acetate of lead is seldom administered internally to the horse, although it is a powerful sedative and astringent. It is frequently given by the human practitioner in cases of internal hæmorrhage, for which it may be also employed by the veterinary surgeon, whether the bleeding takes place from the lungs, liver, kidneys, or mucous membranes. It appears to act not only as a sedative, but also by corrugating the extreme ends of the bleeding vessels, thus

operating as a styptic; or it assists in forming a coagulum there, and thus prevents the escape of more blood. In cases of protracted diarrhœa and diabetes it has sometimes been found of service. The dose may be from ℨi to ℨij, or even more.

It is employed as a collyrium in ophthalmia, when a few grains may be dissolved in distilled water, the proportions being from gr. x to xx in f℥viij water; but, as a local application for phlegmonous inflammation, the quantity may be increased. For this purpose, however, preference appears to be given to the compound next to be described.

Liquor Plumbi Diacetatis, *Solution of the Diacetate of Lead.*

Old Names: Liquor Plumbi Subacetatis, Goulard's Extract, Aqua Vegeto-mineralis.

The formula for this compound is also changed.

Take of Acetate of Lead . . .	2 pounds 3 oz.
Oxide of Lead, in powder,	1 pound 4 oz.
Water	6 pints.

Boil for half an hour, frequently stirring them; and, when cold, add of distilled water a sufficient quantity to measure six pints; lastly, strain the solution.

Oxide of lead, or litharge, is the yellow protoxide of lead, obtained either as a secondary product in the

separation of silver from galena; or by exposing those particles of lead which have not been carbonated in lead manufactories to the action of heat in ovens. It consists of

1 atom Lead	. . . . .	=104
1 ,, Oxygen	. . . .	= 8
Equivalent	. . . .	112

and occurs in small, shining, hard scales, which are unacted on by the air, and inodorous.

Decomposition.—Acetic acid is capable of combining with two equivalents of the oxide of lead, so that, when to the acetate of lead is added the protoxide, a compound is formed consisting of two equivalents of the base and one of acid.

Composition.—1 atom Acetic Acid	. .	= 51
2 ,, Oxide of Lead	112×2	=224
Equivalent	. .	275

This is dissolved in variable proportions of water, and, according to Dr. Paris, was the only instance of a real subsalt being soluble in water.

Properties and Uses.—This compound has received the name of Goulard's extract, from its having been introduced by M. Goulard, of Montpelier, who appears to have designated it Aqua Vegeto-mineralis; hence the abbreviation long employed at this institution of Aq. Vegeto.

When properly prepared, it is of a pale yellowish-green colour, having an acetous odour, and a sweetish styptic taste. It is decomposed by the alkalies and the alkaline carbonates and sulphates; therefore, when it is diluted with spring-water, a heavy precipitate of the carbonates of lead and of lime is thrown down, giving opalescence to the whole. Even distilled water, from the presence of a little carbonic acid, will sometimes occasion a turbidity. It will be inferred from this that only pure distilled water should be employed for its dilution. It is used, externally, for the purpose of reducing superficial inflammations of the skin, and also as a lotion in ophthalmia. It has been conjectured that its value arises from its causing a partial paralysis of the nerves of the part to which it is applied. That the compounds of lead are sedatives, is proved by the fact adverted to, of animals labouring under constipated bowels and colic in the neighbourhood of lead mines. The like effects also will follow the administration of the diacetate of lead in large doses, and the pulse will be rendered less frequent by it; but whether any decided action takes place on its application to the skin, I will not take upon myself to assert. It has been thought that the whole of the good obtained from the use of saturnine lotions is referable to the direct application of cold, coupled with that which arises from evaporation, to aid which a little rectified spirit is added; but I

can see no reason why its influence on the nervous fibrillæ, producing partial paralysis, should be disallowed. The form in which it is topically applied is as follows:—

Liquor Plumbi Diacetatis Dilutus, *Diluted Solution of the Diacetate of Lead.*

Take of	Solution of the Diacetate of Lead,	2 drachms,
	Rectified Spirit	4 drachms,
	Distilled Water	1 pint.

Mix.

When used as a collyrium, the quantity of water is to be doubled.

A valuable liniment for excoriated surfaces, or after the application of a blister, or the firing iron, may be made by triturating together one part of the solution of the diacetate of lead and four parts of olive oil. It may be designated the *Liniment of the Diacetate of Lead;* or, for brevity, *Lead Liniment.*

Potassium, the Metallic Base of the Alkali *Potassa.*

The honour of the discovery of this metal, and through which a new view was taken of the alkaline bodies, belongs to Sir H. Davy. Its properties are interesting and singular. Its colour is that of silver.

At the ordinary temperature of the atmosphere it is soft, and easily moulded by the fingers; at 32° it is hard and brittle, at 150° it is quite fluid. Its specific gravity being ·865, it is consequently lighter than water, and will float upon it. The weight of the atom is 40. Its affinity for oxygen is so great, that it instantly tarnishes on exposure to the air, becoming coated with an incrustation consisting of metallic potassium and its protoxide; nor can it be kept in any of the compounds of this element. Projected on water, it decomposes this fluid rapidly, combining with its oxygen, and setting the hydrogen free; and this, taking with it a small portion of the metal, forms potassiuretted hydrogen, which inflames on coming in contact with the air.

Sir H. Davy first developed the metal by the aid of galvanism. Hydrate of potassa was placed by him between two discs of platinum, and connected with the poles of the galvanic battery of the Royal Institution, when oxygen was evolved at the positive electrode, and minute metallic globules at the negative. These, by union with oxygen, formed potassa; and thus analytically and synthetically it was proved that the alkali potassa consisted of a metallic base, to which the name potassium was given, combined with oxygen. It was subsequently obtained by fusing the hydrate in a gun-barrel, containing iron-filings: these attracted the oxygen, and, the metal being volatilized,

was condensed in a receiver containing naphtha. It is now procured by subjecting potassa, or its carbonate, to distillation in iron bottles, mixed with charcoal. The heat required is intense, and the process one in which great caution is necessary.

Potassii Iodidum, *Iodide of Potassium.*
Old Name: Hydriodate of Potash.

Take of	Iodine	6 oz.
	Carbonate of Potassa	4 oz.
	Iron Filings	2 oz.
	Distilled Water	6 pints.

Mix the iodine with four pints of the water, and add the iron, stirring them frequently with a spatula for half an hour. Apply a gentle heat, and when a greenish colour occurs, add the carbonate, previously dissolved in the two pints of water, and strain. Wash what remains with two pints of boiling distilled water, and again strain. Let the mixed solutions be evaporated, so that crystals may be formed. —*Phillips.*

Decomposition.—The first step in the process results in the formation of an iodide of iron; since, when iodine is brought in contact with iron, direct combination takes place between these two elements, and the compound formed is very soluble in water. This has now to be converted into an iodide of potas-

sium, which is effected by the intervention of carbonate of potassa in solution, when an haloid salt is formed, and carbonate of iron precipitated, as shown in the following diagram:—

Materials.	*Constituents.*		*Products.*
154 Iodide of Iron	1 eq. Iodine	= 126	166 Iodide of Potassium
	1 eq. Iron .	= 28	
70 Carbonate of Potassa	1 eq. Potassium	= 40	
	1 eq. Oxygen	= 8	
	1 eq. Carb. Acid	= 22	58 Carbonate of Iron.

Composition.—1 atom	Iodine . . .	=	126
1 ,,	Potassium . .	=	40
	Equivalent . . .		166

Mr. Youatt and Mr. Karkeek both speak highly of this compound of iodine. The dose to the horse and for cattle may be from 10 to 20 grains, which may be repeated during the day, carefully watching its effects. Mr. Youatt believed it possessed some power to arrest the growth of tubercles in the lungs, and even to disperse them when recently formed. It does not appear to accumulate in the system like iodine, and it is also more certain in its action. The kidneys are the emunctories by which it is ejected, it being easily detected in the urine after it has been administered for only a short time. For mode of detection, see pp. 296-7.

Iodide of potassium occurs in crystals, whose form is cubical. It is a colourless, deliquescent salt, possessing a pungent, bitterish taste, and is extremely soluble in water, the solution having the power of readily dissolving iodine. In rectified spirit it is less soluble.

Tests.—Being anhydrous, it should lose no weight when heated. It is entirely soluble in water, and the solution effects no change in the colour of litmus or turmeric, which indicates its neutrality. Sulphuric acid and starch being added to it together, it becomes blue.

Incompatibles.—Acids, acidulous and metallic salts.

As a topical remedy, the form of ointment is preferred.

UNGUENTUM POTASSII IODIDI, *Ointment of Iodide of Potassium.*

Take of Iodide of Potassium	. .	1 part,
Lard	. . . . . .	8 parts.

Mix.

The activity of this compound may be increased by the addition of half a part of iodine, thus forming the UNGUENTUM IODINII COMPOSITUM; or by doubling the quantity of the iodide.

The action of iodine and its compounds is markedly seen on glandular structures and newly-formed

parts or abnormal growths. For the latter they seem to manifest a decided preference, which renders them so valuable as therapeutic agents. By their influence absorption is promoted; and when they have been long and injudiciously given, it is recorded that the mammæ of women and the testes of men have almost disappeared. A case, illustrative of the effects of iodine upon the glandular system was related to me by Mr. Wardle, who employs this agent largely, and with considerable success. He had been for some weeks exhibiting the iodide of potassium, and also applying it externally, to a bull for an enlarged parotid gland. The reduction of the swelling having been accomplished, his attention was directed to the testicles of his patient, which had become much diminished in size; and it was also found that the animal had no desire to copulate. Four months' generous keep, however, effectually restored the parts to their pristine state.

In chronic enlargements of the submaxillary, parotid, mammary, and other glands; in tumours of long standing; for thickening of the integuments, and indurated swellings about the joints in all our domesticated animals; and for unhealthy ulcerated surfaces, the use of iodine and its compounds is indicated, combining both their internal and external employment. The latter should be accompanied with friction; and as soon as soreness is induced, the ap-

plication of the compound suspended for a time. A desquamation of the cuticle usually follows this, and a reduction of the swelling will soon after be perceptible.

It has also been successfully resorted to in cases of chronic cough and incipient roaring; also for the removal of nebulæ on the cornea.

Unfortunately, it is too often the case, that, if the expectations of the practitioner are not at once realized, the agent is discarded as useless. Now, the compounds of iodine rank amongst those substances whose operation is slow, but which, at the same time, constitute an important class, as their effects are permanent.

Potassii Sulphuretum, *Sulphuret of Potassium.*

This compound is obtained by mixing together one part of sulphur and four parts of carbonate of potassa, and then heating them in a covered crucible till they unite.

Decomposition.—Sulphuret of potassium is the *hepar sulphuris*, or liver of sulphur, of the older pharmacopœias. The changes that take place during its formation are somewhat complicated. Fownes says, "it is a variable mixture of the two higher sulphurets with hyposulphite and sulphate of potash." Phillips considers it to be a mixture of undecom-

posed carbonate of potassa with one equivalent of the hyposulphite of potassa, and two equivalents of the pentasulphuret of potassium. Had equivalents of sulphur and carbonate of potassa been employed, and the temperature not raised beyond 482° F., then the decomposition of the potash salt, it appears would have been complete, by the whole of the carbonic acid being expelled in a gaseous form, and the resulting compound would have been an hyposulphite of potassa and a pentasulphuret of potassium. Accepting it as made up of the more perfect salts, essentially its constitution will be

1 atom Hyposulphite of Potassa . .	=	96
2 atoms Pentasulphuret of Potassium	=	240
Equivalent		336

Properties and Uses.—Liver of sulphur is a hard substance, of a brownish-yellow colour, becoming white on exposure to air by the abstraction of oxygen, which renders it useless; inodorous when dry, but when moistened with water, in which it is readily dissolved, it emits a little sulphuretted hydrogen gas. Its taste is acrid and bitter.

Its use has been lately revived at the College, where it is principally employed externally in skin affections, in the form of solution or ointment, in the proportions of one of the sulphuret to eight of water or of lard; and it has also been given as a

stimulant and diaphoretic, in doses of from ʒss to ʒj to the horse; but its effects as an internal remedy are of questionable efficacy.

Incompatibles.—All the acids, which expel hydrosulphuric acid and throw down the sulphur. It is also decomposed by solutions of most of the metals, which, uniting with the sulphur, are precipitated in the form of sulphurets.

POTASSA, *Potash, or the Protoxide of Potassium.*

This compound may be formed by the action of water on the metal potassium, when a solution of potassa is the result, and, by evaporation, the oxide is obtained; but the expensiveness of this process precludes its general adoption. The usual means had recourse to are, the depriving a solution of the carbonate of potassa of its carbonic acid by the addition of newly-slaked lime, then filtering and evaporating the solution until a dry mass remains, which is afterwards to be fused. Rarely, if ever, is all the water driven off; the compound therefore is, strictly speaking, an hydrated protoxide, consisting of

1 atom	Potassium	= 40
1 ,,	Oxygen	= 8
1 ,,	Water	= 9
	Equivalent	57

Hydrate of potassa, when carefully prepared, is a white acrid substance, possessing caustic properties. Cast into moulds, it constitutes the *Hydras Potassæ* of the Pharmacopœia, and, when in solution, the *Liquor Potassæ.* These compounds are seldom employed in veterinary practice. The deliquescence of the first is an objection to its general use, otherwise it is a very valuable caustic; while the carbonate of potassa is preferred to the last, from its being less acrid.

POTASSÆ BITARTRAS, *Bitartrate of Potassa.*
Old Name: Cream of Tartar.

Bitartrate of potassa is obtained during the vinous fermentation of the juice of the grape, being deposited on the sides of the cask, forming a red encrustation known in commerce by the name of *crude tartar* or *argol.* This consists of the bitartrate of potassa, tartrate of lime, colouring matter, extractive, &c. It is purified by solution in boiling water, and adding albumen and wood ashes: the former, while coagulating, entangles any impurities, and causes them to float on the surface of the solution, from which they may be easily removed; the latter aids this by exciting an effervescence. Sometimes alumina and charcoal are employed to precipitate the colouring matter.

Composition.—	1 atom Potassa . .	=	48
	2 atoms Tartaric Acid	=	132
	1 atom Water . . .	=	9
	Equivalent		189

Properties and Uses.—Bitartrate of potassa occurs as a brittle white crystalline salt, without odour, and having an acidulous and gritty taste. It requires sixty parts of cold and fifteen of boiling water for its solution. In small doses it acts as a refrigerant and diuretic, and in larger doses as a laxative. By common consent it was almost entirely discarded from veterinary practice on account of its little activity, but latterly it has been introduced as a purgative for CATTLE and SHEEP; the dose for the former being from ℥ij to ℥iij, for the latter from ʒvj to ʒviij, combining it with gentian or ginger. (See Proceedings of the Veterinary Medical Association, Session 1838-9, p. 243.)

To the DOG it has been given in quantities of from gr. v to gr. x, united with diuretics, in dropsical affections.

Tests.—It is sparingly soluble in water; reddens the colour of litmus; and by a red heat is converted into the carbonate of potassa.

Potassæ Carbonas Impura, *Impure Carbonate of Potassa.* Vulgo: Potash, Pearlash.

The pearlash of commerce is an impure carbonate of potassa, rendered so by the presence of silicious matter and some other salts. The manner of obtaining it is this:—The stems and branches of plants which grow at a distance from the sea are subjected to smothered combustion. Their ashes being lixiviated, by pouring over them hot or cold water so as to dissolve the alkali, the impregnated solution is evaporated to dryness in iron boilers, when a brownish saline mass remains: the colouring matter and a portion of water being dissipated from this by calcination in a reverberatory furnace, the salt assumes a spongy texture and a blueish colour. This is pearlash, or potash; and the market is principally supplied with it from Russia and America.

It has been found that herbaceous plants by incineration yield a large quantity of potash; shrubs more than trees; and decayed wood more than either. Wormwood is particularly rich in this salt; hence it was formerly called the *salt of wormwood.* One thousand pounds of the ashes of this plant afford seven hundred and forty-eight pounds of potash.

The pearlash of commerce not being sufficiently

pure for medicinal purposes, a purification of it has been directed, as follows:

POTASSÆ CARBONAS, *Carbonate of Potassa.*

Old Names: Subcarbonate of Potassa, Prepared Kali, Salt of Tartar.

This salt is procured by pouring over the pearlash of commerce three or four times its weight of cold water, when a solution of the soluble carbonate is obtained, and the insoluble matters remain behind. The water being evaporated by means of heat, a granulated mass results,—carbonate of potassa,—which, although not perfectly pure, is sufficiently so for all ordinary purposes. A purer salt may be made by calcining cream of tartar (bitartrate of potassa); hence the name of *salt of tartar*, which was once given to this compound.

Composition.—In its dry state, it consists of

1 atom	Potassa	= 48
1 ,,	Carbonic Acid	= 22
	Equivalent	70

Usually, however, there is a little water present, forming it into an hydrate, or rather a sesqui-hydrate.

Properties and Uses.—Carbonate of potassa occurs in small white grains, which are imperfectly formed crystals. Its taste is acrid and alkaline; exposed to

the air it rapidly abstracts moisture from it, or undergoes deliquescence, and this solution, from its having an oil-like appearance, was called *oil of tartar* by the old chemists. On this account, the salt should always be kept in stoppered bottles. It changes vegetable blues to green, neutralizes acids with effervescence, and its base combines with the fatty acids, forming soaps.

It is an antacid and diuretic, and may be given in doses of from ʒij to ʒiv. The form of draught is most desirable.

Tests.—It is almost entirely dissolved by water, a little earthy impurity only remaining behind. This solution should afford no precipitate with nitric acid nor chloride of barium, and but little with nitrate of silver. Potash may be distinguished from soda by its deliquescing, by its solution forming with tartaric acid a crystalline compound, and also giving a precipitate with the chloride of platinum.

Incompatibles.—Acids, and most salts, whether acid, alkaline, earthy, or metallic.

POTASSÆ CHLORAS, *Chlorate of Potassa.* Old Names: Oxymuriate of Potash, and Hyperoxymuriate of Potash.

This salt is prepared by slowly passing a stream of chlorine gas through a cold solution of carbonate

of potassa contained in a Woulfe's bottle. When the effervescence has ceased, the solution is to be allowed to stand for twenty-four hours in a cool place, when it will be found to have deposited crystals of chlorate of potassa. These are to be washed with cold water, re-dissolved, and re-crystallized.

Decomposition.—Three salts appear to be formed when chlorine comes in contact with a solution of carbonate of potassa, namely, chloride of potassium, hypochlorite of potassa, and bicarbonate of potassa. As the quantity of chlorine increases, the last-named compound suffers decomposition; its carbonic acid is evolved; while its base goes to form more of the other two compounds. The solution now becoming highly charged with the hypochlorite, the action is somewhat changed: potassium is liberated, which combines with chlorine, forming a chloride of potassium, and the oxygen unites with the hypochlorite, converting it into a chlorate.

Materials.			*Products.*
4 eq. Chlorine		144	4 eq. Chloride Potassium = 304
4 eq. Potassa	4 eq. Potassium	160	
	4 eq. Oxygen	32	
1 eq. Hypochlorite Potassa		92	1 eq. Chlorate Potassa = 124

Or if caustic potassa be employed, then a portion of the potassa becomes decomposed, its oxygen combining with one portion of chlorine to form chloric

acid, while the potassium is taken up by a second portion of the same substance, and remains in the mother water.

	Materials.	*Products.*
6 eq. Chlorine	5 eq. Chlorine . .	5 equiv. Chloride of Potassium
	1 eq. Chlorine . .	
6 eq. Potassa	5 eq. Potassium . .	
	5 eq. Oxygen . .	
	1 eq. Potassa . .	1 equiv. Chlorate of Potassa.

Composition.—1 atom Potassa . . = 48
1 ,, Chloric Acid . = 76

Equivalent 124

The following method of preparing this salt has been proposed by Professor Such. Pass chlorine gas into a mixture of 1 lb. caustic lime, 1 lb. carbonate of potash, and 8 lbs. of water, so long as any is absorbed. In this way two salts are obtained, the *chlorate of potassa* and the *chloride of calcium.* These may be easily separated, since the former crystallizes readily, and the other does not, it being a highly deliquescent salt.

Properties and Uses.—Chlorate of potassa occurs in the form of colourless crystals or plates of a rhomboidal shape, which are anhydrous, and have a cool and austere taste. Specific gravity, 1·989. When triturated, it appears phosphorescent, and if

projected on live coals deflagrates. It is soluble in 18 parts of cold and $2\frac{1}{2}$ of boiling water. It acts very energetically on many inflammables; and when triturated with sulphur, charcoal, or phosphorus, inflames with detonation. The last is a dangerous experiment. If mixed with sugar, and a drop of sulphuric acid be poured on it, instantaneous combustion results, in consequence of the evolution of peroxide of chlorine. A mixture of this kind, made into a paste with water, was used for the purpose of obtaining light before the introduction of what are called lucifers, &c.; common sulphur matches being covered with it, which, when dry, were dipped into sulphuric acid.

Chlorate of potassa was proposed as a substitute for nitre in the manufacture of gunpowder; but on a trial of it, by trituration it exploded, and many persons were killed. Heated in a glass retort, it fuses with decrepitation, and gives out nearly forty per cent. of its weight of oxygen. The degree of heat required to effect this is much less if it be previously mixed with a small quantity of the peroxide of manganese, or the oxide of copper. This, however, does not arise from oxygen being disengaged from either of the last-named compounds, but is referable to *catalysis*, or decomposition by contact.

This salt has been used medicinally; and Professor Simonds states its effects to be very marked

in cases of hoven and tympanitis, it being given in doses of from ʒj to ℥ij dissolved in water. He found it caused a rapid condensation of the gases eliminated; but occasionally fermentation would again be set up in the vegetable matter, on which account he now prefers the aromatic spirit of ammonia. Its mode of operating has been by no means clearly ascertained. By the chemico-physiologists it was supposed to yield oxygen to the system; but the fact of its passing out unchanged in the urine seems to overthrow this view. Most certainly its action on the stomach and its contents cannot be thus explained. At one time it was thought that the hydrochloric acid of the succus gastricus decomposed the salt, liberating *euchlorine,* which in its turn decomposed the compounds of hydrogen; but as the desired change frequently takes place in the rumen of cattle, where the true gastric juice is not met with, this, perhaps, cannot be accepted as the correct explanation. Its operation, therefore, can only be referred to its stimulating influence, unless some, as yet unknown, effects are produced by it on the evolved gaseous matters. When inflammation is present, and the use of the aromatic spirit of ammonia is contra-indicated, this salt, on the authority of Professor Simonds, may be advantageously employed.

Tests.—Entirely soluble in water, and the solution is not affected by nitrate of silver. Fusible, and at

a higher heat oxygen is given off, leaving a chloride of potassium. A little sulphuric acid renders the crystals first yellow and then red, and expels peroxide of chlorine.

Potassæ Nitras, *Nitrate of Potassa.* Old Names: Nitre, Salt Petre.

This salt may be made by saturating nitric acid with potassa; but it is only procured thus experimentally. As a *natural* product, it is found efflorescing on old walls and in caverns, and it exists very abundantly in the soil of India, whence the market is principally supplied. It is also prepared *artificially* in France and Germany.

The Presidency of Calcutta annually exports 8000 tons of nitre, which comes into the market in bags containing 164 pounds weight each. The soil appears to be merely lixiviated, and the salt crystallized, when it occurs in small crystals of a dirty brown colour, which are much contaminated with common salt and other impurities. From these it is separated by solution, adding a little carbonate of potassa to precipitate the lime, filtration, and re-crystallization. To Mr. J. Western I am indebted for a sample of the earth containing this salt.

The artificial mode of obtaining nitrate of potassa consists in mixing together animal and vegetable

remains with calcareous matters, strewing them in a shallow pit, covered so as to keep off the rain, but permitting, at the same time, the access of atmospheric air, to effect the necessary changes. The whole is frequently stirred, and from time to time a solution of potash is thrown over it. At the end of two or three years, the mass is considered fit to yield nitre, when the processes of lixiviation, filtration, and crystallization, are had recourse to.

The change which takes place is this:—The animal matter, undergoing decomposition, evolves nitrogen, which combines with the oxygen of the air, and forms nitric acid: this is attracted by the lime of the calcareous matter, and thus a nitrate of lime is obtained, which is immediately decomposed by the potassa contained in the vegetable substances; but as this is seldom sufficient to effect its entire decomposition, more is added in the form of carbonate of potash. The resulting compounds are, a nitrate of potassa and a carbonate of lime; and the former is separated from the latter salt by the processes above named.

Composition.—1 atom Potassa	. . . .	= 48
1 atom Nitric Acid	. .	= 54
Equivalent	. . .	102

It contains no water of crystallization, but a little

is frequently met with interposed between the laminæ of its crystals.

Properties and Uses.—Nitrate of potassa occurs in six-sided prismatic crystals, which are colourless and brittle, having a sharp taste, and imparting to the mouth a sensation of coldness. It is soluble in seven parts of water at 60°, and in its own weight of boiling water. During solution, it lowers the temperature of the water. It is unchanged by the air. Exposed to heat, it undergoes fusion; and in this state being cast into moulds, it has received the name of *Sal Prunelle.* If the heat is increased, it suffers decomposition; oxygen gas is driven off, and a nitrite of potassa is left behind.

Internally, it is a febrifuge and diuretic. The dose may be from ʒij to ʒiv. In order to obtain its full effect as the first, it should be exhibited in the form of ball, so that it may undergo solution in the stomach; but as a diuretic, it is best given in solution. It passes to the kidneys unchanged, and its presence may be readily detected in the urine by means of bibulous paper immersed in it, which, on being dried and set on fire, deflagrates; or, if the quantity given be large, it may be procured in crystals from the urine. Very large doses of this salt act as an irritating poison. Two pounds being given in six pints of water to a horse, apparently in health, within half an hour irritation of the mucous lining of the

alimentary canal was set up, evidenced by the fæces being voided frequently and in small quantities. The kidneys were soon after excited into increased action, the urine being forcibly expelled, and the act accompanied with much uneasiness. In about four hours after, the pulse had risen to nearly double the number of beats, and the visible mucous membranes were highly injected. Blood being withdrawn from the jugular vein, it presented all the appearance of arterial blood. In the serum the existence of the salt could be detected, and it was obtained in abundance from the urine. From this period the symptoms became less urgent, and the pulse gradually regained its healthy standard; but the dung and urine continued to be passed more frequently than natural throughout the day.

Externally applied, nitrate of potassa is a valuable stimulant to wounds, and it may be employed with much benefit when gangrene has taken place. For this purpose, a saturated solution is ordered to be kept in the pharmacy.

Solutio Potassæ Nitratis, *Solution of the Nitrate of Potassa.*

Take of	Nitrate of Potassa . .	1 part,
	Water	7 parts.

Dissolve.

As the salt, when undergoing solution, robs the water of much heat, this compound may be beneficially applied, immediately after it is made, to superficial inflammations and slight sprains.

To Cattle the nitrate of potassa may be given in the same quantities as to the horse. The dose for the Sheep should not exceed 1 drachm; for the Dog from 5 to 10 grains. As a local remedy it is equally applicable for all animals.

Tests.—It is totally dissolved by distilled water, and the solution affords no precipitate on the addition of the chloride of barium, or the nitrate of silver; proving the absence of the sulphates and chlorides. It liquefies by heat, and yields oxygen, and the remaining salt, rubbed to powder, gives nitrous acid vapours on the addition of sulphuric acid. It is also known by its power of deflagrating when thrown on red-hot charcoal.

Incompatibles.—Alum, sulphuric acid, and the sulphates of magnesia, zinc, copper, and iron.

Pterocarpi Santalini Lignum, *Red Sandal* or *Sander's Wood.*

The tree yielding this wood is a native of India and Ceylon, thriving most luxuriantly in mountainous and rocky situations. It is brought to this country in billets, which are heavy, and sink in

water; but it is met with in the shops in the form of raspings.

Properties and Uses.—Sander's wood has a rich red colour, which it readily imparts to a mixture of alcohol and water, but not to water alone. A tincture of it may be thus made:—

TINCTURA SANTALINIS RUBRA, *Tincture of Red Sander's Wood.*

Take of	Raspings of Sander's Wood .	1 ounce,
	Proof Spirit	2 pints.

Macerate for seven days, and filter for use. It is employed merely for the sake of its colour.

QUINÆ DISULPHAS, *Disulphate of Quina.*

Take of	Heart-leaved Cinchona, (bruised)	7 pounds,
	Sulphuric Acid	9 ounces,
	Purified Animal Charcoal . .	2 ounces,
	Hydrated Oxide of Lead,	
	Solution of Ammonia,	
	Distilled Water; of each as much as may be sufficient.	

Mix four ounces and two drachms of the sulphuric acid with six gallons of distilled water, and add the cinchona to them; boil for an hour, and strain. In the same manner again boil what remains in water

and acid, mixed in the same proportions, for an hour. Lastly, boil the cinchona in eight gallons of distilled water for three hours, and strain. Wash what remains frequently with boiled distilled water. To the mixed liquors add oxide of lead, while moist, nearly to saturation. Pour off the supernatant liquor, and wash what is thrown down with distilled water. Boil the liquors for a quarter of an hour, and strain; then gradually add solution of ammonia to precipitate the quina. Wash this until nothing alkaline is perceptible. Let what remains be saturated with the rest of the sulphuric acid diluted. Afterwards digest with two ounces of animal charcoal, and strain. Lastly, the charcoal being thoroughly washed, evaporate the liquor cautiously, that crystals may be produced.

Decomposition.—In the various kinds of cinchona there exist two of the vegetable alkaloids, *quina* and *cinchona,* in combination with a peculiar acid, called the *kinic acid.* In some of the varieties the former of these alkalies abounds, in others the latter. When treated with diluted sulphuric acid, the solution contains sulphuric acid, kinic acid, and quina, mixed with extractive and colouring matter. The latter is destroyed by the animal charcoal. On the addition of oxide of lead, the sulphuric acid is removed in the form of sulphate of lead, which, being insoluble, is precipitated, leaving the kinic acid in union with

the quina. By adding ammonia to this, a soluble kinate of ammonia is formed, and quina is precipitated, which is converted into a disulphate by adding sulphuric acid to it.

Composition.—Quina consists of

20 atoms	Carbon . . .	$6 \times 20 =$	120
12 ,,	Hydrogen . .	$1 \times 12 =$	12
2 ,,	Oxygen . . .	$8 \times 2 =$	16
1 atom	Nitrogen	$=$	14
	Equivalent . .		162

The salt under notice, being a disulphate, is thus constituted:

2 atoms Quina . . .	$162 \times 2 =$	324
1 atom Sulphuric Acid . . .	$=$	40
8 atoms Water	$9 \times 8 =$	72
Equivalent . .		436

Properties and Uses.—Disulphate of Quina occurs in small, colourless, acicular crystals, of a pearly lustre, having a bitter taste, and efflorescing on exposure to the air. It is soluble in 740 parts of cold and 30 of boiling water. Thirty parts of alcohol, at the mean temperature, also take up one of quina; but a much larger quantity is dissolved by it at the boiling point.

It is a valuable tonic, and enables us to exhibit the active principle of a drug, unaccompanied by inert

and superfluous substances. It may be employed after the subsidence of acute inflammatory action, when much debility yet exists; and it will be found singularly efficacious during the prostration of strength which supervenes to influenza, being given in doses of from ʒss to ʒj, either alone or combined with other agents of the same class; or a carminative.

The "hospital sulphate of quinine," prepared by Mr. E. Herring, is probably that which will be preferred by the practitioner of veterinary medicine, as it differs not from the commercial article, except that it is not bleached, while the cost is considerably less, owing to the economy of its production, while colour is with us of no importance whatever. The mode of manufacture is patented: but we are told "it is prepared by extracting the colouring of the bark, by means of a caustic solution of soda or potash; thus avoiding the necessity of the usual bleaching agent—impure animal charcoal, and dispensing with the use of alcohol."

Tests.—Soluble in acidulated water; precipitated by ammonia, and the fluid on being evaporated should not taste of sugar. When chlorine is first added, and then ammonia, it becomes green. It is totally consumed by fire.

Incompatibles.—The alkalies, their carbonates, and lime-water, which separate the sulphuric acid,

and precipitate the quina, as do the soluble salts of barytes and lead.

Sabina, *Savine.*

This plant is cultivated in our gardens, but is a native of the southern parts of Europe and Asiatic Russia, flowering in April. It is an evergreen bushy shrub, sometimes spreading horizontally, and at others rising several feet in height.

The officinal parts are the tops, which consist of the young branches, with their attached leaves. These are to be collected in May. In their fresh state they possess a strong peculiar odour, and a nauseous, resinous, bitter taste; properties which they lose in some degree on being dried.

Composition.—Essentially an acrid volatile oil, resin, gallic acid, extractive and lignin.

Properties and Uses.—The activity of the plant depends upon the volatile oil, which, according to Dumas, is a pure hydro-carbon, and constituted, like the oil of turpentine, of 10 eq. carbon and 8 eq. hydrogen. This is readily yielded to the fixed oils and fat; and water and spirit also abstract the general properties of savine.

Rarely is savine given internally, although it has been highly extolled as a vermifuge. When administered in large doses for this purpose, much

gastric irritation has supervened, followed by diuresis, and sometimes violent purging, accompanied with considerable prostration of strength, and a full and irregular pulse. It has been also said so powerfully to excite the uterus as to cause it to expel its contents preternaturally.

Its use is principally as an external application, when it is found to be a powerful local irritant. For this purpose the distilled essential oil may be rubbed on the skin. If applied to sores, it acts on them almost as a caustic. The more common form in which it is employed is that of ointment.

The powder of the leaves has been before spoken of as an agent for the removal of warts. Its activity as an erodent may be much increased by mixing it with an equal weight of pulverized verdigris. This compound may be likewise advantageously sprinkled over old and indolent ulcers.

Unguentum Sabinæ, *Savine Ointment.*

Take of Savine Tops (bruised) . . 1 part,
Lard . . . . 2 parts.

Boil together until the leaves become crisp, then press through a linen cloth.

The heat should not be great, nor quickly communicated, as much of the essential oil will then be dissipated. This ointment should be of a fine green

colour, and possess the smell of the plant. It is advocated for the purpose of keeping up the action of blisters, constituting what are termed *perpetual blisters*. It may also be employed for ill-conditioned wounds, and to increase the discharge from setons.

Sapo, Sapo Durus, Sapo Mollis. *Soap, Hard Soap, Soft Soap.*

Soaps are now regarded as saline compounds resulting from the union of margaric, stearic, and oleic acids with an alkaline base, such as soda or potassa.

Fatty and oleaginous matters, before saponification, consist of these acids in union with a base called *glycerine*. By boiling they become separated, and the acids then combine with one or the other of the above alkaline bases. Thus soaps may be designated an oleate, margarate, or stearate of soda or potassa. When mutton fat is used, the predominating acid will be the stearic; when olive oil, the margaric; and when linseed and other oils, the oleic.

For medicinal purposes, it has been directed that soap should be formed of the purest materials; hence those countries in which the olive-tree abounds, as the south of France, Italy, and Spain, produce a

compound preferable to that of this country. For the uses of the veterinarian, however, this does not appear to be of so much moment, and probably the best kind of hard soap which can be employed by him is the English curd soap; the only important difference between this and the Spanish or Castile soap being, that the latter is made with olive oil and soda, the former with tallow and soda.

The process of making HARD SOAP essentially consists in boiling oleaginous or fatty matters in solutions of the alkali soda, rendered caustic by quick-lime, and constantly stirring the mixture until a union has been effected, which is evidenced by its acquiring viscidity: it is then poured into moulds, where it cools, and in a few days becomes hard. A little common salt is likewise added. The marbled appearance which the Spanish soap has, is imparted to it by sprinkling into the newly-formed compound a little of the oxide and sulphate of iron.

SOFT SOAP is formed by using a ley of potassa instead of soda. The art of making it appears to depend upon effecting the combination in such a manner that the soap ceases not to be in solution; hence the compound is soft or pasty.

Composition.—This has been already given; namely, fat acids in union with an alkaline base.

Properties and Uses.—The external characters of soaps are too well known to need description. The

English curd soap is colourless, and of a fine consistence, does not feel greasy, and has a nauseous alkalescent taste. With water it forms a milky solution. Alcohol dissolves it, forming a gelatinous and nearly pellucid solution.

Soft soap is about the consistence of hogs' lard, transparent, and has small granules scattered throughout it, which consist of stearine.

In large doses, soap may prove a laxative. More probably, however, in the quantities in which it is usually administered, namely, from ℥ss to ℥j, it undergoes decomposition *in transitu*, and its base being carried to the kidneys, these organs are roused to slightly increased action by it; but, whether as a carthartic or a diuretic, its agency is not to be relied on. It is more valuable as an antacid, since it is decomposed by the weakest acids, when, its alkaline base being liberated, it combines with and neutralises them. This is the reason why soap does not form a perfect solution with hard water: the sulphuric acid of the sulphate of lime in the water unites with the soda or potassa of the soap, and is dissolved, while the margaric, stearic, and oleic acids blend with the lime and rise to the top, forming margarate, stearate, and oleate of lime. Hence, too, its incompatibility with all acids and acidulous salts which will combine with its base. Many metallic salts likewise decompose it, as the nitrate of silver, the chloride and bichloride of

mercury, and the sulphates of zinc, copper, and iron; therefore, in excessive doses of any of these compounds, it may be given with advantage.

Externally, it is a stimulant, and is employed beneficially in cases of sprains and bruises, after the inflammatory action has been reduced by the ordinary antiphlogistic remedies. The form of liniment is preferred, which may be thus made:

LINIMENTUM SAPONIS COMPOSITUM, *Compound Liniment of Soap.*

Take of Soft Soap	4 ounces,
Camphor	1 ounce,
Proof Spirit	2 pints,
Solution of Ammonia .	½ pint.

Dissolve the soap and the camphor in the spirit, then add the solution of ammonia, and filter for use.

The old name for this, or a similar compound, is Opodeldoc. Its value as a counter-irritant is perhaps not duly appreciated.

Its action might be rendered more powerful by the addition of some essential oil, as that of turpentine. But the above form will be found extremely useful in cases of sprains and bruises after the local inflammation has been subdued; also for tumours, slight attacks of sore throat, &c. A valuable ANODYNE LINIMENT may be made by mixing with it about one fourth its

bulk of the tincture of opium. This may be beneficially employed in local pains, rheumatism, &c.

SECALE CORNUTUM, *Ergot of Rye.*
Common Name: Spurred Rye.

Two opinions have divided the scientific world respecting this substance. By some it is thought to be a disease of the grain, produced by the puncture of insects; and by others, a fungus or parasitic plant, that locates itself in the ovary of many of the grasses, and which is found more commonly upon rye than upon any other grain. The last is the most prevalent opinion. The market is principally supplied with it from North America.

Properties and Uses.—Ergot of rye is a curved, cylindrical, striated body, usually about half an inch in length; externally of a deep violet colour, and internally whitish. It has a mawkish taste, and burns with a clear yellowish-white flame. In it have been found two principles, both of which are abstracted by water: *Secalin,* analogous to the volatile alkaloids, and *Ergotin,* a nitrogenized acid. Its action is that of a parturient; but it has been said at times to be uncertain in its operation; and what medicinal agent is not? This may arise from the quality of the drug, which is much affected by circumstances. Its activity appears to reside in its

investing tunic; and as this may be rubbed off, or washed off by rains, the remaining part is inert. Imitations of the ergot, formed of plaster of Paris, have been also found in some samples. To ensure its effects, it should be carefully kept in well-stoppered bottles, and never used after it is one year old, or, at the furthest, two years. The dose, either for the MARE or the COW, may be from ʒij to ʒiv in powder, given in ale or beer, and combined with some carminative: this may be repeated every hour. To the SHEEP, from ℈j to ℈ij may be given; and to the DOG, from five to ten grains. The active principles are soluble in water, but the infusion is apt to ferment; a tincture might, therefore, be advantageously kept in the Pharmacy, for which the following form may be accepted:

TINCTURA SECALE CORNUTI, *Tincture of the Ergot of Rye.*

Take of Bruised Ergot of Rye . 1 ounce,
Boiling Water . . . 2 ounces.

Infuse for twenty-four hours; then add—
Rectified Spirit . . . $1\frac{1}{2}$ ounce.

Digest for three days, and filter for use.

As a drachm and a half of this tincture is considered equal in action to twenty grains of the ergot, the dose is easily apportioned.

Since the ergot of rye acts as an excitement to the parturient uterus, causing contraction in it, it should not be exhibited until the regular and natural throes are considerably diminished, and the pauses between them have somewhat increased. I know of but one instance in the mare in which it has been employed with success, and that was by Mr. Walter Richardson; but both Mr. Youatt and Mr. W. C. Spooner speak highly of it in cattle and other animals labouring under difficult and protracted parturition; and such authorities as these bear with them their own weight.

This diseased state of the rye grain, constituting the ergot, has often been productive of the most fearful consequences when partaken of in the form of bread by man, whole districts having been affected by it as with an endemic. It has been said that the poison has been so intense that flies settling on the grain have been killed by it: and deer and swine eating it have died in the most horrible convulsions, or have become covered with ulcers which have speedily run on to mortification.

The Americans appear to have been the first, usefully to apply this agent in medicine; for, although it had been before employed in Germany, yet, on account of an abuse of it, an edict was issued forbidding it any longer to be administered.

Of its activity as a parturient there can be no doubt. It is stated to be a substance of such extra-

ordinary energy as often to compel the womb to render up its contents shortly after its administration: never, then, should it be employed until all the ordinary resources have been completely exhausted, or when, from the atony of the parts, all hopes of a favorable expulsion of the fœtus have been abandoned. Its stimulating influence upon the uterus indeed is such, that this viscus has been occasionally burst by the violent action which has followed its exhibition, while the death of the fœtus has been no uncommon result. These effects may, however, be attributed to an inordinate dose having been given, or the agent resorted to at an improper time.

Dr. Davis says, "the secale ought never to be given where there is any natural defect, either in the pelvis or soft parts, capable of producing a powerful obstacle to the expulsion of the fœtus; neither in those cases where the neck of the uterus is hard, swollen, or painful; in short, where there is rigidity of the parts, and, generally, where the abstraction of blood is indicated, this medicine is improper. The labour should have made some progress; the parts should be well lubricated with natural mucus; the uterine orifice fully dilated, and all the soft parts prepared for delivery. The practitioner should by careful examination be assured that delivery is only retarded by defective action of the womb. The presentation should be natural, and the fœtus so situated

that delivery can be effected by the efforts of the uterus."

It is true that these directions were intended for the practitioner of human medicine; they will, however, equally apply to our patients; for who can for a moment doubt but that the same care and solicitude are in a degree required on the part of the veterinary as the human accoucheur, while the laws of life are the same in both animals?—although, from the comparatively inartificial state in which the lower order of animals are kept, but little difficulty during parturition is usually manifested by them.

If the animal is very much fatigued and feeble, the ergot should not be given till she is refreshed and recruited by suitable nourishment or medicine, lest the exertion it occasions should be more than she can bear.

This agent may likewise be advantageously had recourse to in order to restrain uterine hæmorrhage, and it may prove of service in cases of passive hæmorrhage from other organs, as of the lungs, liver, kidneys, &c.; also to cause the expulsion of the placental membranes when retained by the inertia of the uterus.

A TEST for the purity of the ergot is its watery infusion being of a deep pink colour, and transparent. This colour is heightened by alkalies. If it presents a milky appearance, and small portions of the ergot

are seen floating on the water, it has undergone some change, and should be discarded.

Sodium, *Sodium.* The Metallic Base of the Alkali *Soda.*

This metal was discovered by Sir H. Davy, and by the same means as he developed potassium, to which it bears a close resemblance. It is a soft metal, having the colour of mercury, and a specific gravity somewhat greater than potassium, being ·972. Its atomic weight is 24. There is likewise this farther difference between it and potassium—that although it possesses a great affinity for oxygen, and therefore cannot be kept in any of its compounds, yet when thrown on water it does not decompose it with flame, as potassium does, unless there is some gum dissolved in it, so as to render the water viscid: projected on nitric acid, flame is likewise evolved.

Sodæ Carbonas Impura, *Impure Carbonate of Soda.*
Vulgo: Barilla, Kelp, Natron.

This saline compound is obtained by incinerating the ashes of sea-weeds; it is also found native in many parts of the world, particularly in Egypt; a description of the natron lakes of which is familiar to most persons. Very little, however, of this finds

its way into Britain, the market being supplied either from the shores of the Mediterranean, where the *salsola soda* plant is cultivated expressly for the sake of this salt, or from the Orkney islands, where the *sea-wrack* is employed. The process is simple: the plants being pulled up with their roots, are dried and burnt in furnaces resembling lime-kilns, the heat being sufficient to cause the ashes to run together into a state of semi-fusion. On cooling, this concretes in masses. That obtained from the Mediterranean is denominated *barilla,* and is the best; that from Scotland, *kelp;* and, from this yielding but little of the carbonate, it is the least valuable. The salt is supposed to be formed by the decomposition of the oxalate and other salts of soda, which exist in the vegetable before it is burnt.

Composition.—Both these are necessarily very impure compounds. They consist of the carbonates of soda (in the one there being one fifth, in the other but one twentieth part) and magnesia, muriate of soda, sand, oxide of iron, and water.

Properties and Uses.—Good barilla occurs in cellular masses, having a blueish colour, which soon become covered on the surface with an efflorescence. It should emit no odour. Kelp is more solid, and gives out a sulphurous smell. Both are employed only for the sake of the purer carbonate.

SODÆ CARBONAS, *Carbonate of Soda.*

Old Names: Subcarbonate of Soda, Soda.

This salt is procured by lixiviating barilla, or kelp; or, according to the College of Physicians, two pounds of barilla, in powder, are to be boiled in four pints of distilled water for half an hour, and filtered. Evaporation is then to be had recourse to, and crystals are allowed to form. Very large quantities are now made from common salt, which is first converted into a sulphate of soda by the addition of sulphuric acid, hydrochloric acid being evolved: the sulphate is then decomposed by mixing it with chalk, or some carbonaceous matter, as charcoal, small-coal, or sawdust, and the mixture heated in a reverberatory furnace. Either of these substances, by abstracting oxygen from the sulphuric acid, becomes changed into carbonic acid, which, uniting with the soda, forms a carbonate of soda: and this is obtained from the mass by the processes before adverted to, while sulphurous acid gas escapes.

Composition.—1 atom Soda	. . . .	= 32
1 ,, Carbonic Acid	.	= 22
10 atoms Water	. 9×10	= 90
Equivalent	. . .	144

Properties and Uses.—Carbonate of soda is crystalline in its structure, the form of its crystal being a truncated octohedron. It is soluble in twice its weight of water at 60°, and in less than its own weight of boiling water. It effloresces on exposure to the air, which distinguishes it from the carbonate of potassa; and from this salt it may be further known by means of a solution of tartaric acid, which forms with the last named an insoluble bitartrate, after disengaging carbonic acld; also by its not affording a precipitate with either perchloric or fluosilicic acid, or the chloride of platinum, which the latter never fails to do. It is also characterised by giving a yellow flame to burning alcohol.

As a medicinal agent, the carbonate of soda is to be preferred to that of potassa, as it is less acrid, and bears a closer analogy to animal substances, being found in most of the fluids of the body. It is an antacid, and probably diuretic; and may be given in doses of from ʒij to ʒiv.

Tests.—It is a translucent salt, and entirely soluble in water; possesses an alkaline reaction, and, when exposed to the air, falls down in a state of powder or effloresces.

Potassa and soda were at one time designated the vegetable and mineral alkalies, terms which are not now used, as they convey wrong impressions.

Incompatibles.—Acids, acidulous, earthy, and

metallic salts, lime-water, and the hydrochlorate of ammonia.

Liquor Sodæ Chlorinatæ, *Solution of Chlorinated Soda. Labarraque's Disinfecting Liquid.*

This compound may be made by passing a current of chlorine gas through a dilute solution of the carbonate of soda, or by the action of chlorinated lime diffused through water, upon a solution of carbonate of soda, when a mutual decomposition takes place; carbonate of lime is precipitated, and chlorinated soda remains in solution. By careful evaporation it yields crystals, which produce the original liquid when re-dissolved.

Composition.—This appears not to be accurately known. It is sometimes called *hypochlorite of soda;* but Brande says there is no evidence of hypochlorous acid being in it. If made according to the directions of the College of Physicians, which it is not necessary here to particularise, Phillips considers the compound to consist of chloride of sodium, bicarbonate of soda, and hypochlorite of soda.

Properties and Uses.—The solution of chlorinated soda is of a pale yellow colour, and its taste is sharp and saline. It possesses disinfectant properties, and may be employed for the same purposes as the chlorinated lime, for which, as an internal remedy, per-

haps it would be as well to substitute it, as the resulting compound in the stomach and alimentary tube will be a little hydrochlorate of soda or common salt in solution. As an external agent, however, it must yield to chlorinated lime in veterinary practice. Its action as a disinfectant depends upon the liberation of chlorine.

SODÆ SULPHAS, *Sulphate of Soda.*

Old Name: Glauber's Salt.

This salt, from having been first prepared by Glauber, a German chemist, received the name of Glauber's salt. It is found in many mineral waters, and also effloresced on the surface of the soil in some places; but as an article of commerce it is obtained as a secondary product in the making of the hydrochlorate of ammonia; also during the formation of the carbonate of soda, although the College of Physicians once directed that the residuum, after the procuration of hydrochloric acid, should be saturated with carbonate of soda, and crystallized. The compound, when thus made, however, was not worth the price of the carbonate of soda employed; it was therefore proposed to substitute lime for the soda, and reject the sulphate of lime. But by far the greater quantity results from the action of common salt on the sulphate of ammonia, as above adverted to.

Composition.—1 atom Soda		= 32
1 „ Sulphuric Acid .		= 40
10 atoms Water .	9×10	= 90
Equivalent . . .		162

Properties and Uses.—Sulphate of soda occurs in crystals, which are six-sided and channelled prisms, efflorescing on exposure to the air, soluble in three times their weight of water at 60°, and in an equal weight of boiling water. Its taste is saline, bitter, and nauseous. This salt, according to Mr. B. Clark, is only a diuretic to the horse. For CATTLE it is used largely as a purgative, in doses of a pound or more. Its action depends on its promoting the secretion from the mucous surface of the intestines; and this may be increased by the addition of from twenty to thirty grains of croton farina, withholding half the quantity of sulphate of soda that otherwise would be administered. It is, however, fast giving place to the sulphate of magnesia, which is more certain in its operation. As it quickly effloresces on exposure to air, in this state it is more powerful in action, as it loses nearly half its weight of water of crystallization.

Tests.—It is an efflorescent salt, and entirely dissolved by water. It possesses neither alkaline nor acid reaction. Nitrate of silver throws down scarcely

anything from a dilute solution of it; but nitrate of barytes more, which is not dissolved by nitric acid.

Incompatibles.—Carbonate of potassa, acetate and diacetate of lead, and nitrate of silver.

SODII CHLORIDUM, *Chloride of Sodium.*
Vulgo: Common Salt.

This compound abounds in the mineral kingdom, and it is also obtained from the water of brine springs, of certain lakes, and of the ocean. At some places, immense beds of it, several hundred miles in length, exist; at others, whole mountains are made up of it. When either springs or lakes are charged with it, it is procured by the evaporation of their waters; and this used to be the case with the water of the ocean. The diffusion of so valuable, indeed, indispensable an agent to man, evidences both the wisdom and the design of Him who, having made all things, pronounced them to be "very good."

Composition.—1 atom	Sodium . . .	= 24
1 ,,	Chlorine . . .	= 36
	Equivalent .	60

Properties and Uses.—The general properties of salt are so well known as to require little description. It occurs in crystals, which are of a cubical form, the size varying with the degree of heat applied. When

pure it is colourless, and unacted on by the air; has no odour, but an agreeable and strictly salt taste. It is equally soluble in cold and hot water, requiring two and a half times its weight for solution. Its specific gravity is 2·126.

Salt is an invaluable tonic and alterative. It may be given in doses of one or two ounces, sprinkled over the animal's provender, which will induce him to eat it with avidity. It gently stimulates the stomach and alimentary tube, thus increasing the power of the digestive organs, by which the tonicity of the system is restored. In larger doses it is said to be an anthelmentic and cathartic.

When the horse, the cow, or the sheep is becoming convalescent, and the natural and sanitary stimulus of wholesome food will produce a more certain as well as a safer impulse to the discharge of the natural functions than any medicine can afford, a little salt, or salt and water, sprinkled on the food will be an admirable excitant. On all the ruminantia the influence of this agent is marked; nor are the carnivora less benefited by it. In fact, it appears to be the natural stimulus to the digestive organs of all animals.

Mr. Youatt states that there is no medicine for the rot in sheep which is of the slightest avail in which culinary salt is not the principal ingredient. Also as a purgative, it is second only to Epsom salts in the

first instance: and, whether from the effect of the change of the medicine, or of some chemical composition or decomposition which takes place, it is the surest aperient that can be given when the sulphate of magnesia has failed. It may be administered in the same doses as this agent. Being a tonic as well as a purgative, it is on this account, perhaps, somewhat objectionable in the early stages of fever. It is a vermifuge which, in CATTLE, seldom fails. To the DOG it has been exhibited for the same purpose, being administered in repeated doses till the stomach no longer rejects it.

It is frequently used as an adjunct to clysters.

Externally applied, dissolved in water in the proportion of one pound to a gallon, it is employed as a stimulant for chronic sprains; at least, I am inclined to believe this to be generally its action. For although while undergoing solution the temperature of the water is lowered, yet rarely is it the case that only during this time it is employed; but the solution is kept in the stable until it acquires the same temperature as the air of the stable, and then being applied it becomes a stimulant. If made use of only while the heat of the water is being abstracted, so as to cause the salt to pass from the state of solid to that of liquid, it would, of course, be a refrigerant. Here is again seen the value of an application of the principles of chemical science to medicine.

Spiritus Ætheris Nitrici, *Spirit of Nitric Æther.*

Old Names: Spirit of Nitrous Æther, Sweet Spirits of Nitre.

Take of Rectified Spirit	. .	2 pints,
Nitric Acid	. . .	3½ fluid ounces.

Add the acid gradually to the spirit, and mix; then distil off twenty-eight fluid ounces. (P. L.)

Decomposition.—During the process, both the nitric acid and a portion of the alcohol suffer decomposition. An equivalent of nitric acid loses two equivalents of oxygen, and is thus reduced to hyponitrous acid, whilst an equivalent of ether is at the same time formed; these, by combination, form hyponitrous ether, or hyponitrite of ether, so that the *spiritus ætheris nitrici* of the Pharmacopœia is a mixture of hyponitrous ether and alcohol. According to Phillipps, "the oxygen lost by the nitric acid produces various compounds with the elements of those portions of alcohol which are decomposed, and yet not converted into ether; thus, with its hydrogen it forms water, and with carbon carbonic acid, which is evolved, and oxalic acid, which remains in the retort. With portions of hydrogen and carbon, it gives rise to acetic and malic acids; and when the operation is long continued, a quantity of nitric acid loses more oxygen, so as to be reduced to nitric

oxide gas, and probably even nitrous oxide and azote are evolved." Both Berzelius and Dumas consider the process essentially consists in the reduction of nitric acid to hyponitrous acid by the elements of the alcohols, giving rise to water and carbonic acid: the hyponitrous acid in its turn decomposes another portion of alcohol, forming water and ether, with which latter it combines, and forms hyponitrous ether.

Composition.—4 atoms	Carbon .	$6 \times 4 =$	24
5 ,,	Hydrogen	$1 \times 5 =$	5
1 ,,	Nitrogen .	. . =	14
4 ,,	Oxygen .	$8 \times 4 \times$	32
	Equivalent .	.	75

Or, 1 atom	Ether	= 37
1 ,,	Hyponitrous Acid . .	= 38
	Equivalent . .	75

Properties and Uses.—Spirit of nitric ether is a colourless fluid, having a fragrant odour, and a pungent, slightly acid taste. Its specific gravity should not exceed ·834. It is inflammable and volatile, producing much cold during evaporation. It is an antispasmodic, a diuretic, and diaphoretic. My authority for the last-named property is the late Mr. J. Field. "Nitric ether," he says, "is an admirable remedy; it is a stimulant and diaphoretic." Could

no other be adduced, I should be perfectly contented with this; but I know that this agent is employed by many practitioners, with decided action on the skin. The dose may be from f℥j to f℥ij, given either in tepid water, or, what is much better, in combination with the solution of the acetate of ammonia; the action of the capillaries being at the same time assisted by clothing, without which its effects would, perhaps, be determined to the kidneys.

As an antispasmodic it is usually combined with the tincture of opium, as follows:

Antispasmodic Draught.

Take of	Spirit of Nitric Æther . .	2 ounces,
	Tincture of Opium . . .	1 ounce,
	Solution of Aloes . . .	4 ounces.

Mix.

Should the case demand a repetition of the draught, the solution of aloes is then to be withheld, and water substituted.

For Cattle it has been advocated as a febrifuge, in doses of from f℥ss to f℥j. It has been said "to rouse, to a certain degree, the exhausted powers of the animal, while it rarely brings back the dangerous febrile action that was subsiding." Such influence, I think, I have likewise witnessed in the horse.

SPIRITUS RECTIFICATUS, *Rectified Spirit.*

Common Name: Spirit of Wine.

When certain vegetable principles are subjected to the action of heat and moisture, they undergo definite changes, which are under one common head, denominated fermentation. The stages of this process are three: first, the saccharine; second, the vinous; third, the acetous. The putrefactive change is now accepted as a distinct process.

By the second change it is that the spirit under notice is obtained. The seeds of plants consist principally of farinaceous matter, which frequently becomes converted into sugar; and although the manner in which the metamorphosis is brought about, is, perhaps, but little understood, yet it would appear to consist in a new arrangement of the ultimate elements of the principle. This change, it is well known, takes place during the germination of seeds, as seen in the formation of malt.

I need hardly add, that sugar is likewise an abundant proximate vegetable principle, it being yielded by the sugar-cane of India, which is cultivated largely in our colonies for the sake of its produce; and also furnished by the juices of many other plants, as the maple tree, beet-root, parsnip, carrot, &c. Hence the value of all these as nutritive food for animals.

Saccharine solutions having had the fermentative process set up in them, by exposure to a medium temperature, between 70° and 80° F., and the addition of a little ferment, which is usually yeast,—although any nitrogenized body, in a state of change, will do the same, the molecular disturbance being communicated from the one to the other, the action being called *catalytic*—evolve carbonic acid gas, and are then found to contain a spirituous compound, combined with colouring matter, extractive, and some other principles. These are separable by distillation, when that which passes over into the receiver after re-distillation, is designated ardent spirits; such are brandy, rum, gin, arrack, whiskey; these names being given to certain modifications of alcohol, flavoured with different essential oils, imparted either naturally or artificially.

By again distilling these, rectified spirit is obtained; the water and accidental impurities remaining in the body of the still.

As in this country an infusion of malt is generally resorted to for the procuration of alcohol, it may be as well here to notice the interesting transformations that take place. The amylaceous or starchy matter of the grain has first to be converted into *dextrine;* and this is effected by augmented temperature and the presence of *diastase,* a peculiar principle in the malt, which sets up the required molecular or cata-

lytic action; and as soon as this has commenced, it continues to go on till the whole of the dextrine is changed into sugar, which change is quite independent of the oxygen of the air, nor is there any secondary product. The water being the medium in which the transformation occurs, there would seem to be a fixation of its elements, by which the starch, or rather the dextrine, for both are precisely of the same constitution, becomes transformed into grape sugar.

1 equivalent of Starch consists of	$C_{12}\ H_{10}\ O_{10}$
2 equivalents of Water . . .	$H_2\ O_2$
Equivalent of Grape Sugar	$C_{12}\ H_{12}\ O_{12}$

The following diagram will illustrate the change that takes place in grape sugar when undergoing fermentation, viewing this principle as constituted of $C_{12}\ H_{12}\ O_{12}$; and into this form it is probable all sugar, from whatever source obtained, is converted previously to the formation of alcohol.

The change which Grape Sugar undergoes during the Vinous Fermentation.

1 eq. dry Grape Sugar =180	4 Carbon	=24	4 eq. Carbonic Acid = 88
	8 Carbon	=48	
	8 Oxygen	=64	
	4 Oxygen	=32	
	12 Hydrogen	=12	2 eq. Alcohol = 92

Anhydrous alcohol is thus shown to consist of

4 atoms	Carbon	. . . . . =	24
6 „	Hydrogen	. . . . =	6
2 „	Oxygen	. . . . . =	16
	Equivalent	. . . .	46

Rectified Spirit occurs of various strengths in the shops; the best method of ascertaining which is to take its specific gravity. This, according to the London College, should be at 62° F., ·838, when it contains 84 of pure alcohol and 16 of water, in 100 parts. In proportion to the quantity of water present beyond this, so will its specific gravity increase. Other plans have been suggested, such as the degree of cold generated by its evaporation, the quantity of water abstracted by dry carbonate of potassa, and the capability of its firing gunpowder. This last, however, is a vague test, for it greatly depends upon the quantity tried.

By the term Alcohol, is meant the anhydrous spirit; this, however, is very rarely obtained. The College of Physicians orders, for the obtainment of alcohol, that a gallon of rectified spirit be distilled with one pound of chloride of calcium, till seven pints and four fluid ounces pass over into the receiver; but even this contains a little water.

Proof Spirit, for the use of the pharmacy, is best made extemporaneously, by mixing together

five pints of rectified spirit and three of distilled water. It consists of 49 parts absolute alcohol, and 51 parts of water, in 100. Its specific gravity is ·920.

Properties and Uses.—Alcohol, when diluted, constituting rectified sprit, is a powerful stimulant and antispasmodic, and may be given in doses of from f℥j to f℥ij. It is colourless, and always fluid; evaporates rapidly at the ordinary temperatures of the atmosphere, generating much cold, it is therefore frequently added to refrigerating lotions. It has generally a specific gravity of from ·840 to ·850; is highly inflammable, and burns with scarcely any smoke; possesses a fragrant odour, and a hot, pungent taste; dissolves resins and essential oils, forming varnishes and perfumed essences; and when still further diluted, it is the best solvent for the greater number of the proximate principles of vegetables; the resulting solutions being designated tinctures.

Strychnia, *Strychnia.*

Take of Nux Vomica, bruised . . 2 pounds,
Rectified Spirit . . . . 3 gallons,
Diluted Sulphuric Acid,
Magnesia,
Solution of Ammonia, of each as much as may be sufficient.

Boil the bruised nux vomica with a gallon of the spirit for an hour in a retort, to which a receiver is fitted. Pour off the liquor, and again, and a third time boil what remains with another gallon of spirit, and the spirit recently distilled, and pour off the liquor. Press the nux vomica, and let the spirit distil from the mixed and strained liquors. Evaporate what remains to the proper consistence of an extract. Dissolve this in cold water, and strain. Evaporate the liquor with a gentle heat until it has the consistence of a syrup. To this, while yet warm, gradually add the magnesia to saturation, shaking them together. Set it aside for two days, then pour off the supernatant liquor. Wrap what remains in a cloth, and press. Boil it in spirit, then strain, and let the spirit distil. Add to the residue a very little diluted sulphuric acid, mixed with water, and macerate with a gentle heat. Set aside for twenty-four hours, that crystals may form. Press and dissolve them. Afterwards to these, dissolved in water, add ammonia, frequently shaking them, that the strychnia may be thrown down. Lastly, dissolve this in boiling spirit, and set aside that crystals may be produced.

Decomposition.—The active principles of the nux vomica—*strychnia* and *brucia,*—united to a peculiar acid, the *strychnic,* are taken up by the alcohol, to which, after evaporation, is added magnesia, when

the strychnate of strychnia being decomposed, a strychnate of magnesia is formed, and strychnia set free. When this mixture is again digested in spirit, the strychnia is dissolved, and, being left after distillation, it is taken up by the sulphuric acid: the resulting sulphate of strychnia is then crystallized, and afterwards decomposed by ammonia, when a sulphate of ammonia remains in solution, and strychnia is precipitated, which is directed to be crystallized by the evaporation of its alcoholic solution.

Composition.—30 atoms	Carbon	.	$6 \times 30 =$	180
16 ,,	Hydrogen		$1 \times 16 =$	16
3 ,,	Oxygen	.	$8 \times 3 =$	24
1 atom	Nitrogen	. .	$=$	14
	Equivalent	. . .		234

Properties and Uses.—Strychnia is in the form of minute octoëdral and prismatic crystals, which are colourless and inodorous. It possesses an intensely bitter taste, requires between 6000 and 7000 parts of cold water for its solution, and is insoluble in absolute alcohol; but by diluted alcohol, specific gravity ·835, it is dissolved readily. It acts like the alkalies on vegetable colours, and unites with the acids, forming salts.

Strychnia has been found of service in cases of paralysis in the horse, and chorea in the dog. Its

action is very powerful, and its use calls for much caution. The dose for the horse may be from 1 to 3 grains given twice in the day, combining it with the vegetable tonics; that for the dog from $\frac{1}{16}$ to $\frac{1}{4}$ of a grain. Its influence is conjectured to be on the motor tract of the spinal cord, which it powerfully stimulates, and thus restores the lost power of the muscular system.

When long exhibited, or if given in too large a quantity, the limbs will be seen to tremble, and convulsive paroxysms will be induced by the slightest noises. Sometimes, in the dog, all power of retaining the standing position during the period of its influence is lost; the kidneys are also excited into increased action by it, and the urine is voided involuntarily. Death, too, has sometimes followed, and on this account its employment has been objected to by some practitioners; but the misuse of an agent is no argument against its usefulness. The smaller dose should always be commenced with, and steadily continued until its action be manifested; this failing, the quantity may be cautiously increased. On the horse, when injudiciously given, it is also very powerful in its operation: fifteen grains have proved sufficient to destroy life in this animal.

The potency of this agent, and the long protracted and often incurable diseases in which it has

been known to afford relief, warrant its introduction as a veterinary therapeutic.

To Professor Simonds, and Mr. E. Braby, I am indebted for the history of cases of partial and general paralysis in the horse, in which its use has been attended with success. Several cases have also occurred in the College Infirmary. Mr. Youatt recommends it for chorea in the Dog, which disease I have seen yield to it when other agents have failed.

Tests.—Its purity is judged of by its ready solubility in boiling alcohol diluted with water. It has an intensely bitter taste. Melts by heat, and if more strongly urged, it burns with a black smoke, and leaves carbon. As it usually occurs, it is reddened by nitric acid; but that change of colour rather depends upon the presence of brucia, and is lost on the addition of chloride of tin. With sulphuric acid no change of colour is produced in pure strychnia, "but if a drop of a solution of chromate of potash be added, the mixture speedily acquires a crimson, passing to a blood-red colour. If to this mixture of sulphuric acid and strychnia, a grain of peroxide of lead, or peroxide of manganese, be added, the most splendid colours are brought out, passing rapidly through all the shades of blue, violet, purple, and crimson, into a blood-red colour. This singular property, first pointed out by Marchand, Mack, and

Otto, so far as we have been able to ascertain, is possessed only by strychnia." (*Dr. Taylor.*)—Chloride of gold mixed with its solution in acetic acid, gives a dense yellowish-white precipitate, which is not redissolved on boiling, nor is the gold reduced, but the liquid acquires a pink-red colour. The vapour of iodine and of bromine renders it yellow.

It seems that there is no certain antidote to strychnia. It may be dislodged by emetics from the stomach of the dog, when given in too large doses; and opium, or any other narcotic agent, may be afterwards administered with a view to allay the tetanic action. Chlorine and iodine have also been suggested as counter-poisons, because they form inert compounds with it. Probably its action is of so overwhelming a nature, and that too on the nervous system, that a timely use of these agents cannot be resorted to.

Incompatibles.—The acids and acidulous salts, which neutralize it.

I have thus introduced the formulæ given by the College of Physicians for obtaining the *disulphate of quina, and strychnia,* although I do not for a moment think that either one or the other will be prepared by the veterinary surgeon, the processes being so operose and the agents much better prepared by the practical chemist. But the powerful and beneficial action which has attended the employment of the

vegetable alkaloids and their compounds warrants their more general use; and the time, perhaps, may come when a still greater number will be called for. One great barrier, however, to the general use of these substances, is their expensiveness. We may hope that the advances which chemical science is making will enable us to procure them more readily ere long; for, unquestionably, it is a *desideratum* to obtain the active principle of a vegetable substance free from inert matter. Moreover, the effects of vegetables vary with the mode of culture, favorableness or unfavorableness of the season, care in collecting and drying, as well as many other modifying circumstances. Whether the use of benzole as an agent for the extraction of the alkaloids, as proposed by Mr. S. Williams, will give us all we are desirous of obtaining, remains to be seen. It seems to possess some advantages. (*See the 'Chemist,' No.* 3, *New Series, p.* 142.)

By some persons, a cold watery infusion is supposed to abstract all that is desirable; and others contend that the natural union of the alkaloid with the peculiar acid in the vegetable is preferable to its separation by chemical means: a view with which I confess myself inclined to concur; and since the plan of forming extracts in vacuo has been suggested by Mr. Barry and acted on, I am somewhat surprised that they have not been more frequently used in

veterinary practice; thus supplanting the bulky powders of the barks, gentian-root, and many others.

SULPHUR, *Sulphur*. Common Name: Brimstone.

This is an elementary substance, found abundant in volcanic countries, and also in combination with many metals, as iron, copper, lead, and antimony. In the organic kingdom it is likewise met with in small quantities.

NATIVE SULPHUR is imported from Sicily, where it is found associated with limestone and the sulphates of lime and strontia, from which ore it is extracted by melting in furnaces made in the earth. The sulphurous stones are raised into a cone in those cauldrons, and covered with earth, an opening being left at the top; fire being introduced, it soon communicates with the interior of the pyramid, and in about seven or eight hours the sulphur is found at the bottom of the furnace in a liquid state, from which it is drawn off and cast into moulds.

ROLL SULPHUR is chiefly obtained from the sulphuret of copper in Wales and Cornwall, by roasting the mineral, and collecting the fumes in a chamber of brick-work. It is subsequently purified by fusion, and cast into moulds of wood of a cylindrical form.

SUBLIMED SULPHUR is procured from roll sulphur, by heating it to 500° or 600° F., when it rises rapidly

in the form of vapour, which, being received in a fit receptacle, constitutes the flowers of sulphur of commerce; what remains behind is called *sulphur vivum.* This often contains traces of arsenic, and by many persons it is injudiciously preferred as a local application.

Properties and Uses.—Sulphur is of a pale yellow colour, emitting an unpleasant odour when heated, and burning with dense suffocating fumes. It has a specific gravity of 1·970 to 2·080, and is found in the market in the three states already named. The weight of its atom is 16.

As a therapeutic agent, it is extolled as a laxative and alterative. As the former, it is rarely used for the horse, although it has been said to possess anthelmintic properties. The French veterinarians state that a pound of it acts as a poison on the horse, destroying life. I have given this quantity more than once, and it was followed by much intestinal irritation, and a relaxed state of the fæces only. When the bowels of CATTLE and SHEEP have been excited to action by the sulphate of magnesia, this action is, to a moderate extent, and with perfect safety, kept up by doses of sulphur; the quantity for the former being from six to eight ounces, and for the latter from two to three ounces. It may also be advantageously joined with other purgatives. As an alterative it is usually administered in combi-

nation with the nitrate of potassa and the sulphuret of antimony; a form for which is given at page 145.

Externally, I believe it to be highly valuable in many cutaneous affections, and deserving of general employment. For instance, in mange in the horse it may be added to the compound liniment of tar; and for cattle, sheep, and the dog, it is the basis of all the compounds used for this annoying disease in them.

SULPHURIS IODIDUM, *Iodide of Sulphur.*

Take of Sulphur	. . .	1 ounce,
Iodine	. . . .	4 ounces.

Put the sulphur in a glass vessel, and place on it the iodine. Hold the vessel immersed in boiling water until they have united. Afterwards, when it has cooled, the vessel being broken, break the iodide into fragments, and keep them in a bottle, well stopped.

Composition.—By the agency of heat alone union takes place between the two elementary bodies without any remarkable phenomenon occurring; although some have thought the compound thus obtained is merely a mixture. Phillips views it as a diniodide constituted of—

1 atom Iodine		= 126
2 atoms Sulphur . .	$16 \times 2 =$	32
	Equivalent . . .	158

Properties and Uses.—Iodide of sulphur is in the form of a greyish black crystalline substance; decomposed by a degree of heat, a little exceeding that required for its formation, and when boiled in water the iodine goes off with the steam, leaving the sulphur. It has been resorted to with remarkable success, in the form of ointment, for mange in the dog and other animals, also for several cutaneous diseases of long standing, such as chronic urticaria, &c. I have received so many testimonies to its efficacy from those who have employed it by my recommendation, that I am reluctantly compelled to omit giving their names. Mr. G. T. Brown, in a note to me, says, "Four or five years ago you recommended the iodide of sulphur for chronic urticaria, since then I have continually employed it with invariable success in that disease, and also in others where congestion exists. You are doubtless aware of the influence of this agent in lessening congestion, particularly of the vessels of the skin, while sulphur being available for the majority of skin affections, and imperatively called for in many, a compound formed of the two would seem to give us all that we can desire. I have likewise found it effectual in the removal of

chronic cough in the horse, giving it in half drachm doses with the iodide of potassium, sprinkled over the animal's provender. To the dog labouring under skin affections I also give it, as well as apply it externally." Although the general use of the iodide of sulphur is that of an external remedy, yet from the above it appears it may be advantageously given internally; to the horse in doses of from ʒss to ʒj; to the dog in quantities of five to ten grains.

Tests.—One hundred grains being thoroughly boiled with water, should leave about twenty grains of sulphur; all besides are impurities.

Unguentum Sulphuris Iodidi, *Ointment of the Iodide of Sulphur.*

Take of Iodide of Sulphur, finely powdered	1 part,
Hogs-lard	8 parts.

Intimately mix. This ointment should be made only as required, and used immediately afterwards.

Terebinthina, *Turpentine.*

By this generic name many varieties are known in pharmacy. They are all obtained from different species of the pine-tree. Some exude spontaneously; others flow from wounds made in the bark, and are inspissated by subsequent exposure to the sun. In

veterinary practice we can dispense with most of them, since their chemical and medicinal properties closely resemble each other.

TEREBINTHINA VULGARIS, *Common Turpentine.*

This is the produce of the Scotch fir. It is the kind most commonly used, and may be said to be the only one of the class really required by the veterinary surgeon. It is obtained by making a series of wounds through the bark into the wood of the tree, beginning at its base, and ascending until a strip of bark about nine feet long is removed. The resinous juice soon begins to exude, and is received in a cavity dug in the earth. From time to time it is withdrawn and strained; which is effected by causing it to percolate through a cask having a bottom with holes in it; through these the turpentine passes, while the impurities are retained. Those trees that are most exposed to the sun yield the greatest quantity of turpentine, and this is necessarily more abundant in some seasons than others. A fine tree will afford from six to twelve pounds annually, commencing at the age of forty, and continuing to do so for a century; the wounds being made in different parts of the tree. The market is supplied from the north of Europe,

whence it is exported in casks containing from three to four hundred-weight.

Common turpentine has a dull yellow colour, much viscidity, a peculiar but not disagreeable odour, and a hot acrid taste. It is soluble in alcohol and the fixed and volatile oils, imparts to water its flavour only, is highly inflammable, and burns with a dense smoke.

Composition.—Resin, essential oil, and a peculiar acid—the succinic. These are separable from each other by distillation.

Properties and Uses.—Internally administered, in doses of from ʒss to ʒj, turpentine is a diuretic. Externally, it is employed as a stimulant to excite the suppurative action in wounds, and its compounds are the best that can be had recourse to for this purpose. The digestive ointment of the College is thus made:

UNGUENTUM TEREBINTHINÆ, *Ointment of Turpentine.*

Take of Common Turpentine	.	1 part,
Hogs-lard	. . . . .	3 parts.

Mix together in a water bath. In the summer a little resin or wax may be added, or suet substituted for the lard.

Terebinthinæ Oleum, *Oil of Turpentine.*

From what has been advanced, it must have been inferred that common turpentine is an oleo-resin. The oil being volatile, it is readily obtained by distillation: for which purpose, any quantity of turpentine is put into a copper alembic with water, and heat being applied, about a fourth part, which is the essential oil, passes over into the receiver with the water, on which it floats. A re-distillation of this is directed by the College of Physicians, but this is uncalled for by the veterinary surgeon.

Oil of turpentine, sometimes erroneously called spirit of turpentine, is a limpid colourless fluid, highly volatile, of less specific gravity than water, having a hot pungent taste, and a penetrating terebinthinate odour. It is inflammable, and possesses all the characters of an essential oil. Chemically it ranks among the hydro-carbons, and is designated *camphene*, or *camphogen*. Its composition is,

10 atoms	Carbon . . .	$6 \times 10 = 60$
8 ,,	Hydrogen . .	$1 \times 8 = 8$
	Equivalent . .	68

Exposed to the air it absorbs oxygen, and becomes yellowish and somewhat denser, owing to the formation of a little resin. Oil of turpentine in which

anatomical preparations have been kept sometimes deposits crystals (*hexa-hydrate* of the oil of turpentine). With dry hydrochloric acid it forms what has been designated *artificial camphor.*

Properties and Uses.—The action of this agent upon the horse depends upon the quantity administered. In doses of from ʒij to ʒiv it operates as a diuretic, giving to the urine the odour of violets, and it affords a means by which this therapeutic may be exhibited in the form of draught, blending it with the yolk of an egg, or mucilage and water, so as to constitute an emulsion. This characteristic odour depends upon a change that a portion of the oil undergoes in its passage through the system. In larger quantities its operation is that of a diffusible stimulant, followed by slight diuretic action.

In doses of from ℥iij to ℥vj, it acts as an antispasmodic, and has been often employed at this Institution with the most marked success. It may be administered floating on water, or combined with an equal quantity of oil, or a watery solution of aloes. The addition of from half an ounce to an ounce of the tincture of opium is by many wisely advocated. Some little care is necessary in giving it, for, should it be accidentally thrown over the animal, it will create much irritation. This may be immediately allayed by washing the part in warm water in which a little soda or potash is dissolved.

In doses of half a pint to a pint, it acts on the primæ viæ, causing catharsis, and producing scarcely any immediate effect on the kidneys. A terebinthinate enema has been recommended in cases of obstinate constipation of the bowels; from two to four ounces being thrown up in thin mucilage. It has also been extolled as a vermifuge, particularly for tænia.

Other worms may be destroyed by it, since a small quantity injected up the nostrils of calves has been successfully resorted to for the eradication of filariæ bronchi; and an enema containing it has been used for dislodging ascarides from the rectum.

Externally applied, its effects are very powerful. To the skin it is a very active irritant; and, if employed unmixed, the animal is thrown into a state of violent excitement by it, which continues for some time. On mucous membranes and abraded surfaces no such action takes place. Mixed with oil, it becomes a valuable rubefacient and digestive. The following is the ordinary College formula, the potency of which may be easily increased:

LINIMENTUM TEREBINTHINÆ, *Liniment of Turpentine.*

Take of Oil of Turpentine, and
Olive Oil, of each equal parts.

Mix together.

This compound, whether as a digestive or a rubefacient, will be found useful for all our domesticated animals. Should a more powerful stimulating compound be required, the following may, I think, be advantageously employed:

LINIMENTUM TEREBINTHINÆ COMPOSITUM,

Compound Liniment of Turpentine.

Take of Soft Soap	4	ounces,
Camphor	1	,,
Oil of Turpentine .	16	,,

Shake them together until mixed.

For CATTLE, according to Mr. Youatt, the oil of turpentine, when employed externally, is an irritant. It is also frequently employed as a solvent of the active principle of the blistering fly; one part of powdered cantharides being digested in eight parts of the oil of turpentine for fourteen days. This, on the thick skin of the ox, will, if applied with friction, produce vesication. The same author says, that the oil of turpentine "is administered internally in colic; and some give it in red-water, with a view to cause the debilitated vessels to contract, and thus arrest the passive hæmorrhage which they imagine is then taking place. From the rapidity and great extent with which it is taken up by the absorbents and

carried into the circulation, and the destructive effect which it is known to have on intestinal worms when otherwise brought into contact with them, the trial of its power would be justified in bronchitis, the too frequent and fatal concomitant of which is the presence of thousands of worms in the air-passages." This is particularly the case with calves. The fumes of burning sulphur and tar have been found effectual in the destruction of these parasites, the animals being compelled to inhale them for a short time; and repeating the inhalation on the following day, if necessary. Immense quantities, I am informed by Mr. P. Fry, will be dislodged by this means.

Mr. Dickens, of Kimbolton, in a letter addressed to the Veterinary Medical Association (*Abstract of Proceedings*, 1840-41, p. 218), advocates the exhibition of the oil of turpentine in combination with linseed oil; grounding his practice on the fact, that turpentine is exhaled from the bronchial surfaces, as well as eliminated by the kidneys, and also considering that the existence of these parasites depends upon a diseased condition of the mucous membrane; so that he attacks both the worm and its nidus. He gives it in doses of an ounce, for three or more times, intervening about a week between each dose.

For Sheep, "the oil of turpentine is very useful to wounds of long standing. It will also prevent the attack of the fly."

For the Dog, it is mostly employed as an external application, whether as a rubefacient or a stimulant to wounds. It is also to him an effectual but not always a safe purgative and vermifuge, being given in combination with olive oil, and in doses varying from ʒij to ʒiv. Sometimes sulphurated oil, formerly called *balsam of sulphur*, is substituted for olive oil; but this compound possesses no peculiar properties to recommend it to our notice.

Resina, *Resin.*

I prefer placing this substance here, because it is that which remains after the distillation of common turpentine. The essential oil having passed over into the receiver, the residuum is a brittle semi-transparent mass, denominated resin. It is composed of a mixture of sylvic and pinic acids.

Two kinds of resin occur in the market, black and yellow. If the process of distillation be carried on to dryness, without any addition, some traces of empyreuma will occur in the residuum, and the substance remaining in the retort will be the so-called black resin. When, however, a little water is added, while the turpentine is yet fluid, and blended with the resin by agitation, the residual mass becomes opalescent, and of a yellow colour.

Resins have been conjectured to be volatile oils

saturated with oxygen, since these oils, if exposed to the air, absorb oxygen, and become solid.

This kind of resin can rarely be rendered perfectly free from odour and taste, a little of both being retained by some of the essential oil still remaining. It is insoluble in water, but readily so in alcohol and volatile oils. Some of the fixed oils likewise dissolve it, and many of the acids. With alkaline leys it forms a saponaceous solution. Exposed to heat, it melts, and, if allowed, takes fire, burning with flame and large volumes of smoke.

Resin is a diuretic, and may be given to the horse in doses of from four to six drachms. It enters into the composition of most diuretic masses. The form adopted by the College is as follows:

Diuretic Mass.

Take Resin, pulverized,
Nitrate of Potassa, ditto,
Hard Soap, of each equal parts.

Beat them together, so as to form a uniform mass. Dose from ℥j to ℥iss.

Externally applied, resin is a calefacient. It forms the basis of adhesive plasters, and of what are designated charges. A digestive ointment may be also made by melting together two parts of resin and four parts of lard, this form being substituted, during the summer, for that already described.

In dispensing, whenever turpentine is ordered, I have always used a mixture of four parts resin and one part of the essential oil of turpentine, by which both cleanliness and expedition are secured, while the compound is the same, from turpentine being thus formed synthetically.

Veratrum Album, *White Hellebore.*

Officinal: *Veratri Radix,* White Hellebore Root.

The plant is a perennial, and a native of the mountainous parts of Germany, Italy, Switzerland, and Greece. The root, the part medicinally employed, is fleshy and fusiform, sending off many small fibres. When recent, it has a strong disagreeable smell, which it loses on drying. As it is found in the shops, it is dark-coloured without and light-coloured within, breaking with a starchy fracture. The larger part is cut transversely, the smaller longitudinally. It should be chosen solid, heavy, and free from worm-holes.

Composition.—According to Pelletier, fatty matty, acidulous gallate of veratria, yellow colouring matter, starch, gum, lignin.

Properties and Uses.—Did no other authority than Mr. Percivall exist, this would be quite sufficient to warrant the introduction of this agent into the veterinary materia medica as a nauseant. I know that

it has been employed by many practitioners through his recommendation, and I have often witnessed its powerful effects. It may be given in doses of from twenty to thirty grains every four or six hours, until its action is manifest. As soon as this takes place, the repetition of the dose should be carefully avoided, lest efforts to vomit are produced. Here it is the observant and scientific practitioner is seen: at the same time, this effect operates as an objection to the general use of hellebore, as it can only be administered under the immediate eye of the veterinary surgeon. In larger quantities than those named, as from ℥ss to ℥j, it acts as a violent excitant to the whole system; and, according to Mr. Wright, of Burnham, who employs it in chronic œdematous enlargements of the legs, in these large doses powerfully promotes absorption. Care, however, is requisite, lest inflammation be set up in the mucous lining of the stomach and intestines by it; demulcents, therefore, should be freely given when its operation becomes violent, nor should it ever be administered in these doses until after the bowels have been freely acted on by a purgative. To allay the inordinate excitement produced by it, large quantities of milk have been found highly effective.

Externally applied, either in the form of an ointment, liniment, or decoction, it is a local stimulant, and is used in mange and some few other cutaneous

affections. If the quantity be large, its action as a nauseant will also be evident, and to dogs it has often proved fatal, by its effects on the mucous membrane of the stomach and bowels.

This root, according to Orfila, was the purgative of the Greeks, although others dispute this, accepting the black hellebore instead of it. Its active principle, *veratria*, is very violent and dangerous in its operation, causing hypercatharsis, accompanied by the discharge of blood, and much griping. I have seen half an ounce of the recently pulverized root, given in the form of draught, produce purgation in the horse in little more than half an hour; nevertheless, I would not be thought to advocate its employment for this purpose.

ZINCUM, *Zinc*.

This metal is obtained either from the native carbonate,—*calamine*; or sulphuret,—*blende*. The ore, reduced to small pieces, is exposed to heat so as to dissipate the acid of the former and the sulphur of the latter. It is then mixed with charcoal, and subjected to a rude form of sublimation in pots resembling oil jars in shape, which have an iron tube passed up through them, the lower ends being immersed in water. These pots being filled with the mixture, and placed in the smelting furnace, the

metal is rendered volatile, and, becoming condensed, slowly passes down the tubes into the water in the form of globules: these are afterwards cast into ingots.

Zinc, as met with in commerce, is rarely pure; when it is, it has a brilliant white colour, inclining to blue. It is brittle, crystalline, and has a specific gravity of 6·8 to 7·2. The weight of its atom is 32. It is highly inflammable, burning with a blue flame, and quickly becoming converted into an oxide.

Zinci Carbonas Impurum Præparatum.

Prepared Impure Carbonate of Zinc, Prepared Calamine.

This, in pharmacy, is the native carbonate of zinc calcined and brought into the state of fine powder by levigation and washing, in the same manner as directed for the preparation of chalk.

Zinci Oxydum, *Oxide of Zinc.*

This is obtained by projecting pieces of metallic zinc into a crucible heated to redness, having another inverted over it, but not so as to exclude the air. The metal, when very little above its melting point, attracts oxygen from the atmosphere, and burns with a dazzling flame of a blueish tint, producing an

oxide in the form of light flocculi, formerly called *flowers of zinc.*

The College of Physicians, however, directs the oxide to be precipitated from a solution of the sulphate by means of water of ammonia, subsequently washing and drying the powder upon a sand-bath.

Both this and the first-named compound of zinc are mild astringents, and employed as external applications, being sprinkled over excoriations, ichorous ulcers, and superficial inflammations. Either would form a substitute for the farriers' Armenian bole. If required to be more stimulating, a useful compound may be formed by the mixture of one part of pulverized resin with two parts of the prepared calamine, or oxide of zinc. The following form has also been successfully employed:

Pulvis Zinci Carbonatis Compositus,
Compound Powder of the Carbonate of Zinc.

Take of Carbonate of Zinc, in powder	4 parts,
Alum	1 part.

Mix them.

This is used as a topical astringent, being sprinkled over abrasions, ulcerated heels, open joints, &c. The decomposition which takes place on the contact of moisture materially influences the action of the com-

pound. Carbonic acid is evolved in a gaseous state, by which any fetor is corrected; and, a sulphate of zinc being formed, this acts as an excitant and astringent, its potency being lessened by that portion of the carbonate which has undergone no change.

An ointment of zinc may be made as follows:

UNGUENTUM ZINCI CARBONATIS,
Ointment of Carbonate of Zinc.

Take of	Prepared Carbonate of Zinc .	1 part,
	Hogs' Lard	6 parts.

Mix.

This will be found a useful compound for slight excoriations, &c. It has received the not inapplicable name of the *Healing Ointment.* Should it be required to possess greater activity, the addition of a small quantity of common turpentine is allowable; and particularly is this the case when the wound does possess a healthy character.

ZINCI CHLORIDUM, *Chloride of Zinc.*

Take of	Hydrochloric Acid	1 pint,
	Distilled water	2 pints,
	Zinc, broken in small pieces	7 ounces.

Mix the acid with the water, and to these add the zinc; and the effervescence being nearly finished, apply heat until bubbles cease to be evolved. Pour

off the liquor, strain, and evaporate until the salt be dried. Having melted this in a lightly covered crucible by a red heat, pour it out on a flat and smooth stone. Lastly, when it has cooled, break into small pieces and keep in a well-stoppered vessel.

This compound may also be procured by heating metallic zinc in chlorine gas, or by distilling a mixture of zinc filings and corrosive sublimate. The above form, however, given by the College of Physicians, is by far the more facile mode.

Decomposition.—One equivalent of hydrochloric acid becomes decomposed by the zinc, hydrogen being liberated in a gaseous state, and the chlorine combining with the metal.

Materials.			*Products.*
37 Hydrochloric Acid	Hydrogen	1	1 Hydrogen Gas
	Chlorine	36	
32 Zinc			68 Chloride Zinc.

Composition.—1 atom	Zinc	= 32
1 „	Chlorine	= 36
	Equivalent	68

Properties and Uses.—Chloride of zinc, when recently prepared, is a colourless and translucent solid, but becomes opaque as it cools. It is extremely deliquescent, and consequently very soluble in water; it therefore requires to be kept in closely stoppered bottles. Its taste is very disagreeable and styptic.

Its action that of a caustic and antiseptic. It quickly destroys muscular fibre, blanching it. To the finger it imparts a saponaceous feel, arising from the destruction of the cuticle, which is accompanied with a sensation of warmth. The surface left after the removal of a slough, presents a healthy aspect, and the granulatory process is soon set up in it. Mr. E. Mayhew, in a paper in the *Veterinarian*, has lately advocated the use of this agent in open joints. A scruple is directed by him to be dissolved in a pint of water, with which solution the wound is to be kept bathed, by means of a piece of sponge saturated with it and squeezed against the limb above the lesion. Its operation he considers to be twofold; 1st, it coagulates the escaping synovia: and he directs this coagulum not to be disturbed, so that the healing process may go on internally; 2d, it possesses the power of suppressing luxuriant granulations, while it corrects all fetor that may arise in the wound.

The disinfectant fluid of Sir William Burnett is a fully saturated solution of the chloride of zinc, and being now easily procured, might be made available for veterinary purposes. It is a compound that may be advantageously resorted to for all ill-conditioned wounds and phagedenic ulcers; as it at once destroys the effluvia of putrescence, and by its stimulating effects quickly rouses the parts into healthy action. Indeed, I feel assured that it deserves to be employed

more largely than it has been. Before used, as an ordinary excitant, it requires to be diluted with from sixty to eighty parts of water. In this form Mr. T. W. Gowing has successfully employed it in grease and other affections. In its undiluted state it may be used as a caustic in canker, quittor, and sinuses of the pole or withers, and also for foot-rot in sheep. And probably a very weak solution of it might be advantageously employed for "dipping" of sheep, so as to prevent the attack of the fly.

Tests.—Occasionally some impurities have been met with, arising from their existence in the materials employed, otherwise the compound is not likely to be adulterated. Iron, lead, and arsenic are the metals with which it has been contaminated, and the presence of these is to be demonstrated by their respective reagents.

ZINCI SULPHAS, *Sulphate of Zinc.* Old Names: Vitriolated Zinc, White Vitriol, White Copperas.

Take of Zinc, in small pieces	. .	5 ounces,
Diluted Sulphuric Acid	.	2 pints.

Mix them in a glass vessel, and, the effervescence being over, filter the solution through paper; evaporate and crystallize.

Decomposition.—In this process the water suffers decomposition. Its oxygen oxidizes the metal, which

oxide is dissolved by the sulphuric acid forming it into a sulphate, while its hydrogen, being rendered gaseous, escapes.

Materials.			*Products.*
1 eq. Water	Hydrogen .	1	1 Hydrogen Gas
	Oxygen . .	8	
1 eq. Zinc		32	
1 eq. Sulphuric Acid . . .		40	80 Sulphate of Zinc.

The water is ordered in excess, otherwise the oxide as it is formed, would be thrown down and impede the action.

Composition.—The compound sold in the shops under the name of *purified sulphate of zinc* occurs in crystals, which are four-sided, and terminated by four-sided pyramids, having an acidulous, styptic, metallic taste. It consists of

1 atom Oxide of Zinc . . .		= 40
1 ,, Sulphuric Acid . . .		= 40
7 atoms Water . .	9×7	= 63
Equivalent		143

But by far the greater quantity of sulphate of zinc, known in commerce by the name of *white vitriol*, is prepared from the native sulphuret of zinc, by roast, ing and then exposing it to air and moisture, when the sulphur becomes changed into sulphuric acid- and the metal oxidized; and these, by union, form

the sulphate, which is obtained by lixiviation and crystallization.

Evaporation is generally carried on until the salt concretes into hard granular masses. Thus made, it frequently contains other sulphates in combination, as those of lead, iron, and copper. These, if thought necessary, may be removed by re-solution and slow re-crystallization on some granulated zinc. The sulphate of lead will subside, and the other salts become decomposed by the metallic zinc. But, perhaps, this refinement is not called for by the veterinary surgeon; and as the sulphate of zinc of commerce contains less water of crystallization, it forms for him a more active agent.

Properties and Uses.—Sulphate of zinc is a colourless slightly efflorescent salt, soluble in two and a half times its weight of water at 60°, and in less than its own weight of boiling water. It is an astringent and tonic, but rarely administered internally. Externally applied, it is a valuable compound, being used as an excitant to wounds, and to bring about adhesion of surfaces; on this account, agreeably to the recommendation of Mr. Newport, it has been extensively employed at the College with the greatest success in cases of quittor. Injected in a state of solution into other sinuses, its operation has been found equally beneficial; and also into cavities in which the healing process is tardy; since, by its

powerful stimulating properties, it quickly induces the adhesive inflammation.

A solution thus made is directed to be kept in the College pharmacy:

SOLUTIO ZINCI SULPHATIS, *Solution of Sulphate of Zinc.*

Take of Sulphate of Zinc	. .	1 part,
Water	. . . .	3 parts.

Dissolve and filter.

If much iron be present in the salt used, it will be thrown down in the form of an oxide, giving to the solution a dirty appearance. It may be separated by filtration.

This being nearly saturated, discretion in its application is called for on the part of the practitioner. A more dilute solution has been employed to prevent the sloughing of the integument which so commonly occurs on the introduction of sutures; and as a collyrium, a still weaker solution is sometimes recommended. For the latter it would be preferable, perhaps, to substitute for the sulphate the *acetate of zinc,* which is best made extemporaneously, by mixing a solution of the acetate of lead with that of the sulphate of zinc, when double decomposition takes place, and two new salts are formed,—a soluble acetate of zinc, and an insoluble sulphate of lead. This last is to be

separated by means of a filter, and the clear solution employed: or, from ʒss to ʒj of each of the salts may be dissolved in a pint of distilled water, and the supernatant fluid carefully decanted for use.

A solution of the acetate of zinc has also been found effectual in causing a reduction of the swelling of the legs of hunters, when they have stood in the stable after a hard day's run. Bandages saturated with it are employed; and the best material for these is chamois leather, which not only retains moisture for a longer time than any other substance, but, by its elasticity, gives a degree of compression to the limb that is very desirable.

Sulphate of zinc does not rank as a caustic, yet it appears to possess slight erodent properties.

Tests.—The purity of sulphate of zinc is known by its solubility in water. The precipitate thrown down by ammonia is white, and, if the ammonia be in excess, it is re-dissolved. The presence of copper will be indicated by a blue colour. The precipitate is also insoluble in nitric acid.

Incompatibles.—The alkalies, their carbonates, and astringent vegetable infusions.

Zingiberis Radix, *Ginger Root.*

The ginger plant is a native of the East Indies, but now largely cultivated in the West. The islands of

Barbadoes and Jamaica furnish considerable quantities to the market; and the produce of the last-named is much esteemed. That which is known by the familiar name of ginger root, is the tuber or rhizome, a reservoir of nutriment for a future plant, occurring at the base of the stem. When the herbaceous parts of the plant have withered, the roots are dug up; the tuberous portions are then removed, and the best selected, scraped, washed, and dried with great care in the sun. This is denominated *white ginger*. When less care is manifested, and the roots are scalded after being taken up, by which a portion of the aroma is dissipated, and then dried, *black ginger* is the result. Both kinds are imported in bags, containing about 100 pounds each.

Composition.—Volatile oil, on which its odour depends; resino-extractive, which gives to it pungency; starch, gum, sulphur, some saline matters, and lignin.

Properties and Uses.—Good ginger is firm, heavy, free from worm-holes, and breaks with a starchy fracture. It has a hot biting taste, and an aromatic odour. When its fracture is very fibrous, or short and resinous, or when light and soft, it should be rejected.

Its virtues are extracted both by water and alcohol. Its action is that of a stimulant and carminative; it is therefore advocated in flatulent colic and debility of

the stomach and intestines. As it does not produce the ill effects attributed to those spices whose virtues depend upon the presence of an acrid oil, it has been much employed. It rouses the vitality of the intestinal surface generally, and renders it more susceptible of the influence of cathartics ; hence the reason of the combination of ginger with most purgative substances. It also increases the nervous energy of the stomach, and has found a place among cordials for the horse, which it well deserves, for there is no carminative that can be brought into competition with it. It enters into the following pharmaceutical compound of the College :

Cordial Mass.

Take of Ginger, pulverized,
Gentian root, do., of each equal parts,
Treacle a sufficient quantity to form a mass.

Dose from ℥j to ℥iss.

I believe this simple form will be found preferable to most of the more complicated ones which have been so much extolled. There are, however, some who object to the use of cordials altogether. Such persons conceive that food is the best stimulant to the stomach, varying it so as to excite the appetite ; nevertheless, at times a gentle provocative seems to be desirable. I need hardly add, that the indis-

criminate use of such agents should be abstained from, as they become active stimulants.

For Cattle and Sheep, ginger is the best of all the carminatives, and, with the exception of caraway seeds, it supersedes the use of the trashy compounds which were once advocated by the older practitioners of veterinary medicine under the name of *Compound Powders*. The dose for the former may be from ʒij to ʒiv; for the latter, from ʒss to ʒj. No aperient draught for either animal should be without it.

For the sake of neatness and convenience in dispensing, probably a tincture of ginger may be allowed a place in the pharmacy of the veterinary surgeon.

Tinctura Zingiberis, *Tincture of Ginger.*

Take of Ginger, in coarse powder, 4 ounces,
Proof Spirit . . . . 2 pints.

Macerate for fourteen days, and filter.

The dose of this tincture will be from f℥ss to f℥j. It may be given for the purpose of expelling gaseous matters accumulated in the alimentary canal; or as an antispasmodic, either alone or combined with other substances of the same class. It may likewise be added to aloetic purges when exhibited in the form of draught, to prevent nausea and tormina.

Some practitioners have advocated the external

use of ginger as a rubefacient, but the flour of mustard is a better agent.

When we are desirous of quickly producing counter-irritation on the skin, a piece of linen dipped in strong water of ammonia may be laid on the part, and this covered with a dry cloth, as suggested by Mr. T. W. Gowing, who has most successfully adopted this method, and found a considerable amount of effusion to be the result of the irritation thus set up.

A POSOLOGICAL TABLE

FOR

THE HORSE,

WITH THE

ACTION OF THE MEDICINAL SUBSTANCES.

AGENT.	ACTION.		DOSE.
	Internally.	Externally.	
Acaciæ Gummi	Demulcent	. . . . . .	ad lib.
Acid Aceticum	Astringent	Antiseptic Rubefacient	?
„ Arseniosum	Tonic	Caustic	grs. v to x
„ Hydrochloric	Lithontriptic Tonic	Antiseptic Caustic	fʒij to ʒiv
„ Hydrocy. dil.	Sedative	Sedative	fʒss to ʒj
„ Nitricum	. . . . . .	Caustic	
„ Sulphuric	Tonic	Caustic	ʒj to ʒij
Adeps	. . . . . .	Emollient	
Aloës Extract	Alterative Nauseant Purgative	Traumatic	ʒj to ʒij ʒiv to ʒviij
Alumen	Astringent	Astringent	ʒij to ʒiv
„ Ustum	. . . . . .	Erodent	
Ammonia, Hydrochlo.	. . . . . .	Discutient	
„ Liquor	Stimulant Antacid	Stimulant	f℥ss to f℥j
„ Liq. Acet.	Diaphoretic	Discutient	f℥iv to f℥viij
„ Sesqui-car.	Stimulant	. . . . . .	ʒij to ʒiv
„ Spt. Arom.	Stimulant Antacid	. . . . . .	f℥ss to ℥j
Anthemides Flores	Tonic	. . . . . .	ʒij to ʒiv
Antim. Potass. Tart.	Nauseant Diaphoretic	Irritant	ʒss to ʒj
„ Ter-Chlorid	. . . . . .	Caustic	
„ Ter-Sulph.	Alterative	. . . . . .	ʒij to ℥ss
Argenti Nitras	. . . . . .	Caustic	
Arsenic Iodide	Alterative Tonic	. . . . . .	grs. v to xx
Æther Sulphuricus	Antispasmodic	Refrigerant	fʒiv to ʒvj
Barii Nitras	Alterative Tonic	. . . . . .	ʒss to ʒj
Belladon. Extract.	Narcotic	Sedative	ʒij to ʒiv

AGENT.	ACTION. Internally.	ACTION. Externally.	DOSE.
Calx Chlorinata	Antiseptic	Antiseptic	ʒij to ʒiv
Camphora	Narcotic	Discutient	ʒj to ʒij
Cantharis	Stimulant Diuretic	Vesicant	gr. v to x
Capsici Baccæ	Carminative		gr. x to xx
Carui Semina	Carminative		℥ss to ℥j
Cascar. Cortex	Tonic		ʒij to ʒiv
Catechu Ext.	Astringent		ʒj to ʒij
Chloroform	Sedative		℥j to ℥ij
Colchicum	Diuretic Diaphoretic Laxative		ʒj to ʒij
Collodion		Adhesive	
Copaiba	Diuretic		℥ss to ℥j
Creasoton	Antiseptic Tonic	Caustic Antiseptic	fʒss to ʒj ?
Cretæ Prepar.	Antacid	Absorbent	℥ij to ℥iv
Croton Semina	Purgative	Irritant	gr. xij to xxiv
„ Oleum	Purgative		gtt. xx to xxx
„ Farina	Purgative		gr. xx to xl
Cupri Ammon. Sulph.	Tonic		ʒj to ʒij
„ Diacetas	Tonic	Erodent Detergent	ʒj to ʒij
„ Diniodidum	Alterative Tonic	Detergent	ʒj to ʒij
„ Sulphas	Astringent Tonic	Erodent Excitant	ʒj to ℥j
Digitalis	Narcotic Diuretic		gr. xx to xl ʒj to ʒij
Ferri Iodidum	Alterative Tonic		ʒss to ʒj
„ Sulphas	Astringent Tonic		ʒij to ʒiv
Gallæ	Astringent	Astringent	ʒij to ʒiv
Gentianæ Rad.	Tonic		ʒij to ʒiv
„ Tinctura	Tonic		f℥ss to ℥j
Helleboris Nig.		Excitant	
Hydrarg. Am. Chlor.		Detergent	
Hydrarg. Bichlorid.	Alterative	Caustic	gr. v to x
„ Chlorid.	Alterative Cathartic		gr. x to xx ʒss to ʒij
„ Biniodid.		Stimulant Detergent	

AGENT.	ACTION. Internally.	ACTION. Externally.	DOSE.
Hydrarg. Nitratis	. . . .	Detergent . .	
„ Oxydum	Alterative . . .	. . . . . .	ʒj to ʒiss
„ „ Nitric	. . . .	Erodent . . .	
Hyosciami Ext.	Narcot. & Anodyne	Sedative . .	ʒj to ʒij
„ Tinct. Eth.	Narcot. & Anodyne	. . . . . .	℥j to ℥ij
Iodinium	Glandular excitant	Glandular excitant	gr. v to x
Lini Semina	Demulcent . .	. . . . . .	ad lib.
„ Oleum	Laxative . . .	Emollient . .	Oj to Oij
Magnesia	Antacid . . .	. . . . . .	℥ss to ℥j
Magnesiæ Sulph.	Laxative . / Diuretic? .	. . . . . .	℔ss to ℔j
Morrhua Oleum	Alterative . . .	. . . . . .	Oss to Oj
Myrrha	Antiseptic . / Tonic . .	Traumatic . .	ʒij to ʒiv
Oleum Olivæ	Demulcent . .	Emollient . .	Oj to Oiss
„ Palmæ	. . . .	Emollient . .	
„ Rapi	. . . .	Emollient . .	
Opium	Narcotic and Antispasmodic	. . . . . .	ʒj to ʒij
„ Tinctura		Anodyne . .	f℥ss to ℥ij
Petroleum	Stimulant . . .	Stimulant . .	℥ij to ℥iv
Pimenta Baccæ	Stimulant . / Tonic . .	. . . . . .	ʒij to ʒiv
Pix Abietina	. . . .	Rubefacient .	
„ Liquida	. . . .	Rubefacient .	
„ Nigra	. . . .	Rubefacient .	
Plumbi Acetas	Sedative . . / Astringent .	Sedative . .	ʒj to ʒij
„ Diacetas	. . . .	Sedative . .	
Potassa	. . . .	Caustic . . .	
Potassæ Carbonas	Antacid . . / Diuretic . .	. . . . . .	ʒij to ʒiv
„ Chloras	Stimulant? . .	. . . . . .	ʒj to ʒij
„ Nitras	Febrifuge . / Diuretic . .	Refrigerant . / Antiseptic .	ʒij to ʒiv
Potassii Iodidum	Glandular excitant	Glandular excit.	℈j to ʒss
„ Sulphuret	Diaphoretic . .	Detergent . .	ʒss to ʒj
Quinæ Disulphas	Tonic . . .	. . . . . .	ʒss to ʒj
Resina	Diuretic . . .	Calefacient . .	℥ss to ℥j
Sabina	. . . .	Irritant . . .	
Sapo	Antacid . / Diuretic .	Stimulant . .	℥ss to ℥ij
Secale Cornutum	Parturient . .	. . . . . .	ʒij to ʒiv

AGENT.	ACTION.		DOSE.
	Internally.	Externally.	
Sodæ Carbonas . .	Antacid . . Diuretic . .	. . . . . .	ʒij to ʒiv
„ Chlorinat. liq.	Antiseptic . . .	Antiseptic . .	f℥ss to ℥ij
„ Sulphas . .	Diuretic ? . . .	. . . . . .	℔ss to lbj
Sodii Chloridum .	Tonic . . . Alterative .	Stimulant . .	℥j to ℥iv
Spirit. Etheris Nit. .	Antispasmodic Diuretic . . Diaphoretic .	. . . . . .	f℥j to ℥ij
„ Rectificatus .	Stimulant . Antispasmodic	Refrigerant .	f℥j to ℥ij
Strychnia . . .	Stimulant to the Motor Nerves .	. . . . . .	gr. j to iij
Sulphur	Laxative . Alterative .	Detergent . .	℥j to ℥iv
Sulphuris Iodidum .	Alterative . . .	Detergent . .	ʒss to ʒj
Terebinthinæ Vulg. .	Diuretic . . .	Digestive . .	℥ss to ℥j
Terebinthinæ Oleum	Diuretic . . Antispasmodic Cathartic .	Irritant . Digestive .	fʒij to ʒiv f℥iij to ℥vj Oj
Veratrum Album .	Nauseant and Stimulant	Irritant . . .	gr. xx to xxx
Zinci Acetas . . .	. . . .	Astringent . .	
„ Carbonas . .	. . . .	Astringent . .	
„ Chloridum .	. . . .	Caustic . . .	
„ Oxydum . .	. . . .	Astringent . .	
„ Sulphas . .	Astringent . Tonic . .	Erodent . Astringent	ʒj to ʒij
Zingiberis Radix . .	Carminative . .	. . . . . .	ʒij to ʒiv
„ Tinct. .	Carminative & Antispasmodic	. . . . . .	f℥ss to f℥j.

TABLE

OF

SYMBOLS OF MEDICINAL COMPOUNDS,

WITH THEIR EQUIVALENTS.

Page		Symbol.	Equivalent.
44	Acacia, Gum . .	$C_{12}H_{11}O_{11}$.	= 171
47	Acid, Acetic . .	$C_4 H_3 O_3$.	= 51
48	„ „ Glacial	$C_4 H_3 O_3$, HO	= 60
53	„ Arsenious .	$As O_3$ . .	= 99
64	„ Hydrochloric .	HCl. .	= 37
68	„ Hydrocyanic .	HCy . .	= 27
218	„ Hydrosulphuric	HS . .	= 17
73	„ Nitric . .	NO_5 . .	= 54
72	„ „ Hydrous	NO_5, $1\frac{1}{2}$HO .	= 67·5
78	„ Sulphuric .	SO_3 . .	= 40
79	„ „ Hydrous	SO_3, HO .	= 49
252	„ Tannic . .	$C_{18} H_8 O_{12}$.	= 212
394	Alcohol . . .	$C_4H_6O_2$ vel C_4H_5O, HO	= 46
52	„ Pyroxylic .	$C_2 H_4 O_2$.	= 32
109	Alum, crystallised (*Phillips*) .	$Al_2 O_3$ $3SO_3$, KO, SO_3, 24 HO	= 476

Page		Symbol.	Equivalent.
114	Ammonia . .	NH_3 . .	= 17
126	„ Acetate .	$NH_3, C_4 H_3 O_3$	= 68
117	„ Hydrochloras	NH_3, HCl .	= 54
121	„ Sesquicarbonate	$NH_3 1\frac{1}{2} CO_2$, HO	= 59
135	Antimony, Potassio-tartrate	$SbO_3 C_4 H_2 O_5$, KO, $C_4 H_2 O_5$; 3HO	= 360
142	„ Terchloride	$Sb\,Cl_3$ . .	= 237
144	„ Tersulphuret	$Sb\,S_3$ . .	= 177
62	Arsenic, Iodide .	As I . .	= 453
389	Æther, Hyponitrite .	$C_4 H_5 O, NO_3$	= 75
157	Æther, Sulphuric .	$C_4 H_5 O$.	= 37
161	Barium, Chloride .	Ba Cl, 2 HO .	= 123
160	Baryta . . .	Ba O . .	= 77
ib.	„ Carbonate .	Ba O, CO_2 .	= 99
161	Baryta, Nitrate .	Ba O, NO_5 .	= 131
160	„ Sulphate .	Ba O, SO_3 .	= 117
168	Camphene . .	$C_{10} H_8$ . .	= 68
169	Camphor . .	$C_{10} H_8 O$.	= 76
172	Cantharidine . .	$C_{10} H_6 O_4$ . .	= 98
188	Chloroform . .	$C_2 H Cl_3$.	= 121
206	Creasote . . .	$C_{14} H_9 O_2$.	= 109
210	Chalk, *see Lime, Carbonate*		= 50
222	Copper, Acetate .	Cu O, $C_4 H_3 O_3$, HO	= 100
ib.	„ Diacetate .	2CuO,$C_4 H_3 O_3$,6HO	= 185
225	„ Diniodide .	2Cu I . . .	= 190
230	„ Sulphate .	Cu O, SO_3, 5HO	= 125
68	Cyanogen . .	N C_2 or Cy .	= 26
157	Ethyle	$C_4 H_5$ . . .	2 9
ib.	„ Oxide, *see Æther, Sulph.*		= 37
394	„ Hydrated Oxide, *see Alcohol* .		= 46
242	Iron, Iodide (crystal.)	Fe I, 5 HO .	= 199
241	„ Sulphate „	FeO, SO_3, 7HO	= 139

Page		Symbol.	Equivalent.
247	„ Sulphuret .	$Fe\,S$ . .	= 44
336	Lead, Acetate . .	$PbO, C_4H_3O_3, 3HO$	= 190
338	„ Diacetate .	$2PbO, C_4\,H_3\,O_3$	= 275
ib.	„ Oxide . .	$Pb\,O$.	= 112
210	Lime, Carbonate .	$Ca\,O, CO_2$.	= 50
165	„ Chlorinated .	$2\,Ca\,O, 2\,HO, Cl$	= 110
303	Magnesia . .	$Mg\,O$ . .	= 20
304	„ Carbonate .	$Mg\,O, CO_2$.	= 42
305	„ Sulphate .	$Mg\,O, SO_3\,7HO$	= 123
292	Mercury, Ammonio-chloride	$Hg_2N_2H_6Cl_2$	= 306
	„ *vel*	$HgCl_2, NH_3, HgCl, NH_3, HgN$	= 756
264	„ Bichloride	$Hg\,Cl_2$.	= 272
262	„ *vel* . .	$Hg\,Cl$ . .	= 136
280	„ Biniodide .	$Hg\,I_2$ . .	= 452
	„ *vel* . .	$Hg\,I$ . .	= 226
291	„ Binoxide .	$Hg\,O_2$ . .	= 216
274	„ Chloride .	$Hg\,Cl$ . .	= 236
270	„ *vel* . .	$2\,Hg\,Cl$.	= 236
52	Methyle . . .	$C_2\,H_3$.	= 15
52	„ Oxide .	$C_2\,H_{31}\,O$.	= 23
51	„ „ Hydrated	$C_2\,H\,O_2$.	= 32
343	Potassium, Iodide .	$K\,I$ . .	= 166
347	„ Sulphuret	$KO, 2SO_2, K_2\,S_{10}$	= 336
348	„ Oxide (hydrous)	KO, HO .	= 57
350	Potassa, Bi-tartrate .	$KO, 2C_4H_2O5, HO$	= 189
352	„ Carbonate .	KO, CO_2 .	= 70
355	„ Chlorate .	$KO, Cl\,O_5$	= 124
359	„ Nitrate . .	KO, NO_5 .	= 102
365	Quina . . .	$C_{20}\,H_{12}\,O_2\,N$	= 162
ib.	„ Disulphate .	$2C_{20}H_{12}O_2N, SO_3\,8HO$	= 436
154	Silver, Cyanide .	$Ag\,Cy$ . .	= 134
151	„ Nitrate . .	$Ag\,O, NO_5$.	= 170

Page		Symbol.	Equivalent.
380	Soda . . .	NaO . .	= 32
ib.	„ Carbonate .	$NaO, CO_2, 10HO$	= 144
384	„ Sulphate (crystal)	$NaO, SO_3, 10HO$	= 162
385	Sodium, Chloride .	$NaCl$ . .	= 60
397	Strychnia . .	$C_{30}H_{16}O_3N$	= 234
405	Sulphur, Iodide .	S_2I . .	= 158
422	Zinc, Chloride . .	$ZnCl$ . .	= 68
419	„ Oxide . .	ZnO . .	= 40
425	„ Sulphate (crystal)	$ZnO, SO_3, 7HO$	= 143

ERRATUM.

Page 13, atomic weight of Mercury, *for* 202, *read* 200.

INDEX.

30

C. and J. Adlard, Printers, Bartholomew Close.